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# RECURRING MYXOMATOUS, CUTANEOUS CYSTS OF THE FINGERS AND TOES


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MYXOMATOUS, cutaneous cysts or so called "synovial lesions of the skin" have received little attention in medical literature. The scarcity of adequate descriptions of the condition and the unusual experience of excising one of these innocuous looking cysts of the finger only to have it recur after multiple removals have led to the following study. A cutaneous condition such as is here described might seem to be primarily of dermatological interest, but since these peculiar cysts are usually extirpated by surgeons who have the embarrassment of seeing them recur repeatedly, it is appropriate to present this material in a surgical journal. My attention was called to the subject by Prof. S. B. Wolbach who first encountered such a lesion (Case 1) in 1928, the findings in this instance being unique in his extensive knowledge of pathological material. This original observation and the subsequent study of 7 additional examples form the basis of the present report.

These thin walled cysts, filled with a colorless, gelatinous, viscid fluid and occurring on the dorsal aspects of the fingers or toes arrest the attention on two accounts. First, they are extremely refractory to surgical treatment, but can usually be cured by radium or x-ray irradiation. Second, their pathogenesis is puzzling and the cause for the myxomatous degeneration of the derma which gives rise to the cyst formation is as yet unexplained.

Interest was initially directed to the condition by Hyde in 1883, who in a later edition of his *Diseases of the Skin* in 1897 gave credit for the original description to Jones and Markins of St. Thomas' Hospital, London, when they exhibited several specimens before the London Pathological Society. Succeeding accounts were usually made in the form of presentation of cases for diagnosis at dermatological societies. The total number of reports in the literature is small and only 14 could be accepted and used for analysis, the data of which appear in Table I. The lesion is obviously rare, yet the finding of the last 5 cases herein reported within a period of 2 months makes it probable that the condition is more common than was formerly suspected.


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### CLINICAL FINDINGS

The cysts are usually about the size of a pea, though they may vary considerably in overall dimensions. The smallest one in the present series (Case 7) was 5 millimeters in diameter and 3 millimeters high, while the largest ones (Cases 6 and 8) were each 12 millimeters in

greatest length. Inspection shows these swellings to be smoothly rounded, thin walled structures which often can be transilluminated. Occasionally, the wall is thin enough so that the lesion has a vesicular appearance. The color is that of normal skin, but there may be a faint yellowish or bluish cast. The skin surrounding the base of a cyst does not show any increased vascularity unless there has been a superimposed secondary infection. External pressure will not reduce the size of the mass for the cyst cavity does not communicate with a joint, bursa, or tendon sheath. Tenderness is usually mild or absent.

In all of the 14 cases gathered from the literature and in 7 of the examples here recorded, a finger was involved by the lesion, but in 1 of our patients (Case 2), the same condition was found on a toe. In 15 cases in which information is available, the right hand was involved in 12 and the left in 3. The number of lesions appearing on the various fingers was as follows: thumb, 2; index finger, 6; middle finger, 9; ring finger, 0; little finger, 1. The toe involved in our second case was the right middle one. Such a cyst is found only on the dorsal surface of the digit, usually in proximity to a joint which most often is the distal interphalangeal articulation. When found in the neighborhood of a joint, it is likely to be situated a little to one side of the midline of the digit (Fig. 1, frontispiece), but if it is situated some distance from a joint, it may be in the midline (Fig. 17).

The condition is not distributed equally between the two sexes, for 75 per cent of the patients were women. The youngest age at which the lesion has been described was 26 years, and the oldest was 66 years, the average being 48 years.

The clinical history reveals that these cysts have usually been present for considerable periods of time, varying from several months to a few years, the average being about 9 months. The patient frequently states that the cyst has been pricked open on several occasions, believing the vesicle to be of little consequence. When this drainage has been done, the fluid thus released is always described as being clear and colorless and having a syrupy consistency. In every instance the individual was surprised to find that such drainage gave only temporary relief and was followed by prompt recurrence in two to four weeks' time.

## PATHOLOGY

The benign appearance of these lesions and the slight attention which is paid to them in their early stages makes it impossible to study specimens showing the first changes, for these are seldom surgically removed. Recurrent lesions, however, have been excised fairly soon after their reappearance so that this material can be utilized for observing the changes which take place prior to actual cyst formation. The completely formed cysts have been occasionally examined histologically and the findings in this stage are more familiar. The following description represents the pathological changes as far as we have been able to study them.

The first variation from the normal appears to be a degeneration or resorption of the collagen in a localized but poorly limited area of the derma (Figs. 4 and 5). The fibroblasts remain as a sort of skeleton framework, with but little intercellular material. These connective tissue cells apparently persist in a fairly good state of preservation for a long time, at least they show degeneration much more slowly than does the collagen. Between the separated cells there then collects a faintly staining, basophilic, mucoid material which gradually increases in amount (Fig. 3) and the cell processes and fibrils become widely separated so that the tissue has a very loose texture. As these changes proceed, the widely spaced fibroblasts gradually disintegrate and multiple minute cavities appear (Fig. 6). These gradually increase in number and size and finally coalesce so that a cyst forms which is grossly visible and which contains a clear and glairy fluid of gelatinous or syrupy consistency. Thus in the earliest formed cysts, the walls have a loose textured and myxomatous structure and may be irregular or jagged (Fig. 2). If the cyst is left undisturbed for a considerable period of time (possibly several months or more) its inner wall becomes smoothly rounded, more dense, and well defined. When this stage is reached, a rather

TABLE I.—LIST OF PREVIOUSLY PUBLISHED CASES

| Author | Year reported | Age Sex | Digit involved | Size of lesion | Duration of disease | Treatment and results |
|---|---|---|---|---|---|---|
| Lingenfelter | 1913 | 51 F | Dorsal surface, over distal interphalangeal joint, right middle finger | Pea size | 14 mos. | Incision—recurred<br>Excision—recurred<br>Curettage—recurred<br>Cauterization with nitric and carbolic acid—recurred<br>$CO_2$ snow—recurred<br>Fulguration—recurred<br>Treated with resorcin and salicylic acid crystals—recurred<br>X-ray exposures (? dose)—cured |
| Ormsby | 1913 | 46 F | Dorsal surface distal articulation, right middle finger | Larger than a pea | 5 mos. | Excision—recurred<br>Incision—recurred<br>Incision—recurred<br>Radiotherapy—cured |
| Ormsby | 1913 | 48 F | Distal phalanx index finger | Pea size | 8 mos. | Excision—recurred<br>Incision—recurred<br>Radiotherapy and electrolysis—cured |
| Ormsby | 1913 | 50 F | Over distal articulation of index finger | Larger than a pea | 4 mos. | Radiotherapy—cured |
| Ormsby | 1913 | 66 M | | Pea size | 18 mos. | Incision and electrolysis—cured |
| Sutton | 1916 | 58 F | Distal phalanx, right middle finger | Pea size | 18 mos. | Incision—recurred<br>Incision—recurred |
| Sutton | 1916 | 26 F | Dorsal surface of metacarpophalangeal joint, index finger | Pea size | 5 mos. | Radium treatment—cured |
| Pussey, quoted by MacKee and Andrews (7) | 1921 | F | Over distal phalanx right middle finger | Pea size | | |
| Pussey, quoted by MacKee and Andrews (7) | 1921 | M | Over distal interphalangeal joint, right middle finger | Pea size | | |
| Montgomery and Culver | 1922 | | | | | Excision—recurred<br>Curettage—recurred<br>Cauterized with trichloracetic acid—recurred<br>X-ray—cured |
| Montgomery and Culver | 1922 | | | | | Repeated surgical operations—recurred<br>Radium—cured |
| Montgomery and Culver | 1922 | | Over distal interphalangeal joint, right index finger | | | |
| Savatard (Case 2) | 1924 | 46 F | Dorsal aspect, distal interphalangeal joint, right fifth finger | Pea size | 8 yrs. | Excised—?result |
| Savatard (Case 3) | 1924 | 26 M | Just below nail of right thumb | 4–5 mm. in diameter | Few months | Application of phenol—recurred<br>Radium—cured |

normal appearing derma abutts directly on the cyst lumen (Figs. 7, 13, and 16).

When these lesions have been completely excised and studied for possible connection with a subjacent structure (such as joint cavity, tendon sheath, or bursa) no communication has ever been demonstrated. From this description and from the case reports it may be seen that there is no epithelial or endothelial lining to the cysts (Figs. 8, 13, 16). Therefore, the mucoid material which collects in such a cyst is in no way a secretory product but must be regarded as having its origin only from degeneration of the local connective tissue.

One of the unusual cytological features in both the early myxomatous substance and the fully developed cystic lesion is the absence of any appreciable leucocytic infiltration. Wandering cells are rarely seen, and when present are usually of the lymphocytic series and appear in only small numbers. In no case has there been any evidence of hemorrhage, either old or recent, so that local hemorrhage (from trauma, etc.) cannot be regarded as the primary event in the histological changes. The microscopic picture does not suggest that infarction will explain all of the findings. Furthermore, the blood vessels of neighboring

tissues do not show changes with sufficient frequency to regard them as important. Arteritis or other pathology of the vessel walls has not been observed or recorded, either in the published cases or in the present series, but, in one case we found old, fibrous thrombi in regional vessels. These thrombi, however, may have been formed as a result of previous therapeutic procedures.

### ETIOLOGY

The pathogenesis of this type of cutaneous cyst is unknown. The condition represents a localized degenerative process in the corium, the originating cause of which is very obscure. As was previously pointed out in the section on pathology, the connective tissues of the deeper portions of the corium undergo a myxomatous change, the collagen gradually disappears, and a basic staining mucoid material collects between the remaining fibroblasts. This loose-textured substance forms the swelling seen in the earliest lesions, and at this stage there is no actual lumen present on gross examination. As the process continues, however, liquefaction occurs in the central portion of such myxomatous tissue and this hollowing out results in a cavity filled with semi-fluid material. There is, then, no secretory activity concerned in the development of the lesions; in other words, the fluid found in the cyst is not produced by a mucous membrane lining the cyst wall, for such a layer does not exist. In short, the cavitation results solely from a focal degeneration of the dermal layer of the skin.

It is difficult to understand why a small area of connective tissue should undergo this spontaneous autolysis. It is even harder to comprehend why it should continue to do so after repeated excisions of the local mass. Only two theories seem worthy of consideration. First, local injury may be of some importance, for the sites of election (dorsal surfaces of the fingers) are constantly exposed to trauma of varied sorts. Repeated knocks, blows, continued pressure, squeezing, etc.—usually minor enough to be forgotten—may possibly so alter the derma that degenerative processes are instituted. Second, thrombosis of small arterial channels may cause the regional blood supply to vary so that incomplete or partial nourishment produces these changes.

Several authors have expressed the view that these myxomatous lesions might have a derivation from a nearby joint cavity or tendon sheath, yet it is a fact that no one has ever demonstrated such a communication. It has been common experience, which is further substantiated by our Cases 1, 2, 3, and 6, that complete excision of the lesion is possible without cutting across a lumen leading to such structures. Furthermore, microscopic examinations of the cysts have not shown any extraneous connections. Therefore, the term "synovial lesions" which some writers have employed in designating these cysts is an improper one and is misleading. In summary, the idea that the cyst is an outpocketing of one of the serous membranes of a digit is wholly untenable.

Savatard presented 3 cases of "Peri-Articular Fibroma of the Skin (Synovial Lesion of the Skin)" the first of which was a solid fibroma and was obviously different from the condition under discussion. His second case, however, appeared to be typical of these "synovial lesions," and while Savatard believed this to represent a cystic degeneration of a fibroma, his description and illustrations cast grave doubt on this view. In his third case biopsy examination was not made, but it was undoubtedly one of the cysts here discussed. This author's material does not lend any justifiable evidence to the view that a myxomatous cyst of the digit may originate from a fibroma.

Nachlas reported a series of "Cystic Nodules of the Terminal Finger Joints" which may possibly have some relationship to our myxomatous cysts. The nodules which Nachlas described were believed by him to be precursors in the formation of Heberden's nodes of hypertrophic osteo-arthritis. This author did not include any pathological description of his material, hence it is impossible to draw analogies or differences in the two conditions, yet some of his gross descriptions were strongly reminiscent of the cysts here presented. However, lack of further evidence prohibits the elaboration of this discussion.

TABLE II.—LIST OF CASES IN PRESENT SERIES

| Case | Age Sex | Digit involved | Size of lesion | Duration of lesion | Treatment and results |
|---|---|---|---|---|---|
| 1 | 51 M | Right middle finger distal phalanx, base of nail | 5 mm. diameter | 10 mos. | 1. Opened—recurred<br>2. Opened—recurred<br>3. Opened—recurred<br>4. Opened—recurred<br>5. Incised—recurred<br>6. Total excision—recurred<br>7. Total excision complicated by severe secondary infection—cured |
| 2 | 54 M | Right middle toe. Lateral aspect, near distal interphalangeal joint (Fig. 1) | 8 mm. diameter | 1 month | 1. Incised—recurred<br>2. Excised—recurred<br>3. Aspirated—recurred<br>4. Toe amputated |
| 3 | 60 F | Right middle finger over distal interphalangeal joint (Fig. 1, finger and section) | 4 mm. diameter | 2½ mos. | Excised—recurred<br>X-ray (600 r)—cured |
| 4 | 50 F | Left middle finger, on terminal phalanx (Fig. 9) | 11 mm. long<br>9 mm. wide<br>6 mm. high | 5 mos. | 1. Incision—recurred<br>2. Incision plus x-ray (600 r)—cured |
| 5 | 65 F | Right index finger, over terminal interphalangeal joint (Fig. 11) | 6 mm. diameter | 1 yr. | 1. X-ray (600 r) had little effect<br>2. Cyst incised and evacuated—cured |
| 6 | 46 F | Right middle finger near distal interphalangeal joint (Fig. 14) | 12 mm. long<br>8 mm. wide<br>5 mm. high | 1 yr. | 1. Excision—recurred<br>2. Excision—recurred<br>3. Incision plus x-ray (600 r)—recurred<br>4. Aspiration plus x-ray (900 r)—partial recurrence<br>5. Total excision—cured |
| 7 | 46 F | Left index finger, on terminal phalanx (Fig. 17) | 5 mm. diameter<br>3 mm. diameter | 9 mos. | Excision plus x-ray (600 r)—cured |
| 8 | 49 F | Left thumb, on terminal phalanx (Fig. 18) | 7 mm. long<br>12 mm. wide<br>5 mm. high | 3 mos. | Incision plus x-ray (600 r)—cured |

A review of the material shows no evidence of neoplasia. The persistence of these cysts for months or years and the manner in which they recur again and again after excision would at first suggest that there may be some new-growth which recurs locally after extirpation. The findings, however, are those characteristic of a degenerative and not a neoplastic lesion.

In passing, it must be noted that other parts of the body may possibly have cutaneous lesions such as are here described on the digits. A case in point is that of Letulle and Bazy. This patient, a girl 17 years old, had a "synovial lesion" on the palmar aspect of the wrist which repeatedly recurred after excision and required four operative removals. Histologically, there was a myxomatous type of central degeneration similar to that which we have seen on the fingers and on a toe. Furthermore, there has been a growing opinion for many years that all ganglia such as occur on the back of the hands and wrists do not represent outpocketings of joint or tendon sheath cavities, but some are the result of a collagenous degeneration of the local connective tissue (Clarke). It is possibly this difference of origin of "ganglia" (outpocketings of sheaths and joints as opposed to degeneration of connective tissue) which accounts for the success or failure (30 per cent recurrence) following their surgical removal. We are led to believe that included in those cases which have been classified as "ganglia" there may have been some instances of the pathological process such as is here described as occurring on the digits.

## TREATMENT

A review of the cases listed in Tables I and II shows the various forms of treatment which have been tried and the results which have been obtained in each instance. It has been learned empirically that most surgical therapy, including drainage, excision, curettage, and insertion of sclerosing or caustic fluids is without avail, whereas x-ray or radium irradiation in adequate dosage is almost universally successful in producing a permanent cure.

*Incision and drainage.* Many patients had often voluntarily pricked open the cysts on multiple occasions before seeking professional

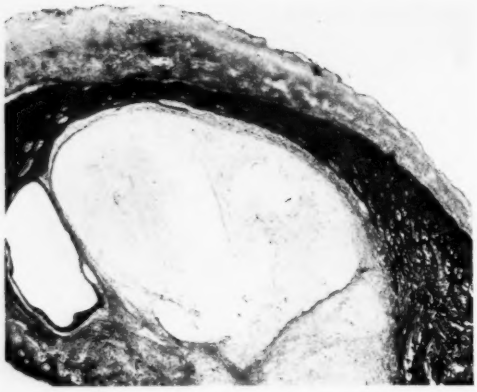

Fig. 2. Photomicrograph of the myxomatous cyst removed at the first operation in Case 1. The cavity is formed by a myxomatous degeneration of the corium. The loose textured connective tissue of the cyst wall merges gradually into the normal derma as is seen in the right lower portion of the picture. At the left, a downgrowth of the epidermal layer has surrounded a small part of the cyst. ×20.

attention. In every case this procedure was followed by recurrence within several weeks. More extensive incision and expression of the cyst contents were performed by physicians in at least 6 cases, but every time that incision and drainage alone was done there was a subsequent recurrence. In 3 cases incision and evacuation of the cyst were followed by x-ray treatment and in 1 case it was accompanied by "electrolysis"; in each of these 4 patients there was a permanent cure.

*Curettage.* In 2 cases, the cyst was opened and the walls of its cavity were curetted. Recurrence was observed in both instances.

*Cauterization.* Application of various caustics to the interior of the cyst was performed in 4 cases, and all failed to prevent a recurrence. The chemicals employed were: (1) nitric acid, (2) carbolic acid, and (3) trichloracetic acid.

*Electrolysis.* In 2 cases "electrolysis" was successfully employed. In 1 of the patients, the electrical treatment was combined with incision and drainage of the cyst and in the other one irradiation therapy was also used. Neither report gave the technique of the electrical coagulation.

*Fulguration.* This was used in 1 case, but was followed by reappearance of the cyst.

*Freezing with carbon dioxide snow.* In only 1 case was this tried—the attempt being unsuccessful.

*Surgical excision.* Complete removal of the lesion *en masse* was done in 9 cases and in only 1 of these was a cure effected (Case 1). In this instance the operation was followed by extensive local secondary infection and osteomyelitis of the terminal phalanx. Therefore, it should be stressed that in no case did surgical excision alone effect a cure, but on the contrary was followed by a recurrence in every instance.

*Amputation.* In one instance (Case 2) amputation of a toe was performed. This was done after a previous local excision had been followed by a recurrence of the lesion. Not knowing the nature of the condition at that time, amputation was decided upon and performed. However, in the light of our present knowledge, this type of operation was unwarranted.

*Combinations of treatments.* In order to point out the persistence of these lesions and the difficulty in treating them the 3 following illustrative cases are summarized:

1. Lingenfelter's case. A pea sized mass, present for 14 months over the distal interphalangeal joint of the right middle finger, was treated as follows:

| | |
|---|---|
| Incised and drained | recurred |
| Excised | recurred |
| Curetted out | recurred |
| Cauterized with nitric acid and carbolic acid | recurred |
| Carbon dioxide snow applied | recurred |
| Fulgurated | recurred |
| Treated with resorcin and salicylic acid crystals | recurred |
| X-ray treatment | cured |

2. Again, in our Case 1, a cyst on the right middle finger of 10 months' duration was treated as follows:

| | |
|---|---|
| Incised | recurred |
| Incised | recurred |
| Incised | recurred |
| Incised | recurred |
| Incised and drained | recurred |
| Local excision | recurred |
| Local excision complicated by severe sepsis | cured |

3. A third example is our Case 6 in which a cyst of 1 year's duration on the right middle finger was:

| | |
|---|---|
| Excised | recurred |
| Excised | recurred |
| Incised plus x-ray irradiation (600 r) | recurred |
| Aspirated plus x-ray irradiation (960 r) | recurred |
| Total local excision | cured |

*X-ray or radium irradiation.* It is evident from empirical findings that irradiation with

x-rays or radium is the treatment of choice. The reports in the literature have practically no discussion regarding the necessary amounts of exposure which are required. Sutton (13, 14) treated 1 patient successfully, apparently using 10 milligrams of unscreened radium, one-half hour daily for 8 doses, making a total dosage of 40 milligram hours. We have employed x-ray therapy in 6 cases using each time 600 r (300 r for 2 doses, 2 days apart). In 5 lesions thus treated there was no recurrence but another patient (Case 6) was given an additional 960 r (430 r in 2 doses, 2 days apart) which reduced the size of the cyst to about one-third of its former volume. The limited experience with x-ray treatment of these cysts makes it probable that further experimenting will be necessary in order to ascertain the dosage which will be effective in all cases. One gains the impression that an intense local reaction must be set up in order to be effective, and that at least an erythema should be produced.

## CASE REPORTS[1]

CASE 1. C. H. was a 51 year old man who noticed a small bleb about 5 millimeters in diameter at the base of the nail of the right middle finger. He opened this with a pin and expressed some gelatinous material, but the cyst reappeared within several weeks. The patient further opened this structure on 3 occasions during the next 4 months, but following each of these the cyst again reformed. At the end of 5 months it was then incised by a physician and the performance of reappearing was again enacted. Examination (10 months after the origin of the cyst) showed a small, thin walled translucent vesicle about 5 millimeters in diameter lying just at the base of the nail, in the midline of the terminal phalanx.

Under local anesthesia the entire cyst, with a little of the surrounding normal tissue, was excised. In 4 months a similar small cyst had recurred and excision of the lesion was again performed under novocaine anesthesia. A few days after this second operation, the site showed evidence of infection with involvement of the surrounding soft tissues as well as the underlying bone. After great difficulty in treating the osteomyelitis, the finger healed and though the terminal phalanx is slightly deformed from the secondary infection, there is no evidence of recurrence of the cyst 8 years later. (Without doubt the extensive local inflammation played an important rôle in the healing of this lesion which 5 previous incisions and 1 excision had failed to eradicate.)

[1] I am indebted to Dr. Francis Newton, Dr. Harlan Newton, and Dr. David Cheever for their kind permissions to include Cases 1, 2, and 3, respectively.

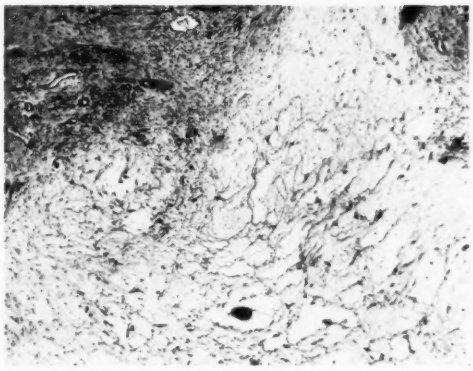

Fig. 3. Photomicrograph of recurrent myxomatous lesion of a finger (Case 1) removed at second operation. This tissue shows the change which takes place in the derma preceding cavity formation. The corium, in most of the field, has lost a large portion of its collagen and has a loose textured structure. There is no leucocytic reaction. ×40.

*Pathological examination of the first surgical specimen* showed it to be an oval shaped piece of skin 8 millimeters long, 5 millimeters wide, and 5 millimeters thick. In the middle portion of this, and bulging up on the external surface was a small thin walled structure about 4 millimeters in diameter which when sectioned was found to contain a thick, gelatinous, somewhat stringy material resembling mucus. Microscopically, the cystic area lay wholly within the derma and consisted of an irregular cavity, the walls of which were formed by an edematous connective tissue of very loose texture and which was directly continuous with and merged into the adjacent corium (Fig. 2). It appeared that the derma in this area had undergone a degenerative change, the first phase of which was a resorption of collagen, leaving a loosely woven meshwork of fibroblasts, between the cell processes and fibrils of which were small amounts of some flocculent, basophilic staining material. In the central portion of the lesion degeneration was more marked and had advanced to actual cavitation. There was, then, no epithelial or endothelial lining to the cyst. In the tissues surrounding this cyst there was no apparent change in vascularity, and infiltrating leucocytes were found in only small numbers, those present being mostly lymphocytes. Toward one edge of the cyst was a narrow rim of epidermal cells dipping down and surrounding a part of the loose texture tissue in such a way as to give the impression that the epidermis was attempting to surround and wall off or extrude this abnormal substance.

*Pathological examination of the material removed at the second operation* showed it to consist of a small piece of skin with a centrally placed light gray soft nodule 2 to 3 millimeters in diameter which lay in the corium and which bulged up the overlying

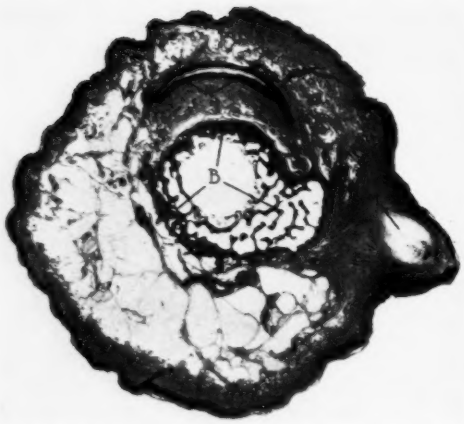


Fig. 4. Photomicrograph of recurrent myxomatous cyst of a toe (Case 2—same specimen as shown in Fig. 1). The illustration includes an entire cross section of the digit which was amputated at the second operation. On the right can be seen the projection from the skin surface; this nodule containing the degeneration in its corium (this entire lesion had been excised 15 months previously). Higher powers of this area are seen in Figures 5 and 6. *N*, Nailbed; *B*, bone of phalanx; *M*, myxomatous lesion. ×4.

epidermis. Histologically, portions of this material showed cicatrization and organization which most likely resulted from the previous operative procedure. The greater part of the specimen, however, again showed a very loose texture, myxomatous type of connective tissue replacing the dermal layer

Fig. 6. Photomicrograph showing higher power detail from the right upper portion of the lesion illustrated in Figure 5. The pathological change is confined to the derma and is a localized degeneration of this layer. The myxomatous substance toward the left has no evidence of neoplasm. The three zones marked *x* represent beginning cavitation. ×45.

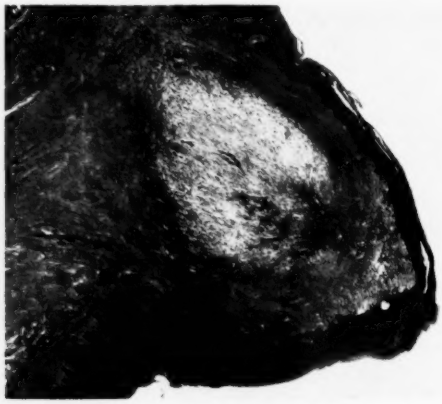

Fig. 5. Photomicrograph showing higher details of the cutaneous nodule seen on the right side of Figure 4. The area of degeneration in the corium has no well defined borders. There is no communication with underlying structures such as joint cavity or bursa. ×13.

locally (Fig. 3). There was no line of demarcation between the more or less normal appearing corium peripherally and the centrally located loose textured lesion. No large central cyst was seen, but there were several small cavities scattered through the areas of mucoid degeneration.

Case 2. C. S. was a 54 year old man who complained of a cystic swelling on the right third toe, of 1 month's duration. Examination showed a nontender, translucent, raised and rounded swelling on the lateral aspect of the toe over the distal interphalangeal joint. This was incised and a "clear, viscid material like vitreous of the eye" was evacuated with resultant collapse of the cyst. Cultures showed no growth. The wound healed *per primam*, but in 4 weeks' time there was recurrence and a mass 7 to 8 millimeters in diameter had re-formed. Under local anesthesia this was excised and "the sac wall of the cyst was completely removed." No communication with the neighboring joint could be demonstrated. The wound healed well. One month later there was evidence of a small fluctuant swelling beneath the old scar. This was punctured and a colorless, viscid material was aspirated. Cultures of this showed no growth. Following the last aspiration the lesion quickly recurred and then gradually grew to attain a diameter of 8 millimeters during the course of the following 15 months. At this time local findings were those illustrated in Figure 1. The cyst was now somewhat translucent, had a broad base, and projected well above the surface of the surrounding skin. Amputation of the toe was decided upon and was performed.

*Pathological examination of the first specimen* showed a small elliptical piece of skin containing a centrally placed vesicle 7 to 8 millimeters in diameter which lay within the derma, and which was

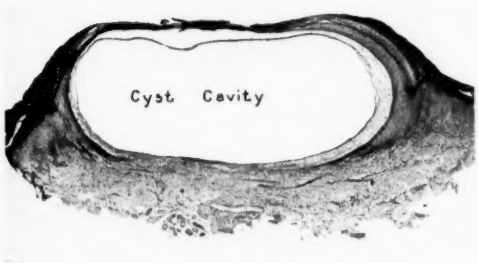


Fig. 7. Photomicrograph of cross section of entire cystic lesion removed from a finger (Case 3). The smooth walled cavity lies wholly within the derma, for a narrow rim of this connective tissue can be traced over the entire dome of the cyst. There is no epithelial or endothelial lining of the cavity. There is no communication between the cyst and the deeper structures. The epidermis dips in deeply at either side of the cyst as though it is attempting to surround and extrude the lesion. For higher power detail see Figure 8. ×15.

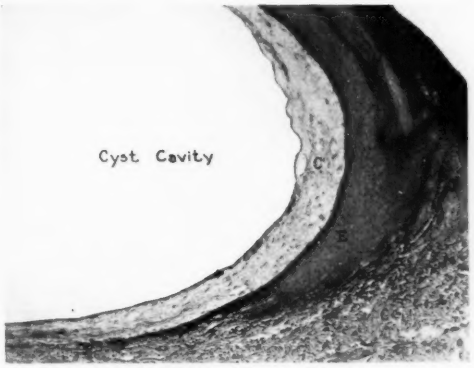


Fig. 8. Photomicrograph showing detail from the right end of Figure 7. The connective tissue around the cyst cavity has a loose texture, which is seen best toward the right. There is no cyst lining. *C*, Corium; *E*, epidermis. ×50.

covered externally by a thin walled epidermal coat. This cyst had a faint bluish color, and incision of it produced a few drops of crystal clear, viscid material resembling that of the vitreous humor of an eye. This was acid in reaction (to phenolphthalein indicator) and produced a white precipitate with acetic acid. Histologically there was a cyst lying wholly within the derma. While connective tissue entirely surrounded the cyst, there was only a very thin (0.5 millimeter) layer of it superiorly separating the cyst cavity from the overlying epidermis. The cyst did not have any epithelial or endothelial lining, its walls being composed only of connective tissue of varying density. Around most of the cyst wall this tissue was somewhat dense and possessed a dense collagenous intercellular substance, but elsewhere it had a loose textured edematous or myxomatous appearance, and collagen was quite scanty in amount. In the wall of the cyst, blood vessels were possibly somewhat more numerous than in normal corium, but this appearance may have been due to loss of local supporting substance and apposition of previously existing vessels. A few scattered lymphocytes represented the only leucocytic infiltration.

*Pathological examination of the second surgical specimen (amputated toe)* showed the cyst over the lateral aspect of the terminal interphalangeal joint as described in the clinical notes here given. The specimen was hardened in 10 per cent formalin (causing the cyst to shrink greatly) and was then decalcified in order that celloidin sections might be cut through the entire toe. Careful microscopic study was done and 28 sections were cut at various levels through the lesion for the purpose of ascertaining whether or not there was a connection with the synovial membrane of the adjacent joint. *Nowhere did the lesion communicate with the joint, nor was there any connection with the nail bed.* The whole process was confined to the corium of the skin and showed only a localized myxomatous tissue without sharp boundaries (Figs. 4, 5, and 6). In the central portion of the lesion, the connective tissue had widely separated, delicate fibrils. The type of cell and cell processes resembled in general those found in embryonic connective tissue and that seen in myxomatous tumors (Fig. 6). There was no leucocytic infiltration of importance. No abnormal vascularity appeared in the surrounding tissues and no thrombus was found in any vessel. There was no evidence of neoplasm. The process was regarded as a peculiar myxomatous degeneration of the corium.

Case 3. F. C. was a 60 year old woman who originally noticed some abnormality over the dorsal aspect of the terminal interphalangeal joint of the right middle finger 2½ months prior to the time she sought medical attention. During the early part of this interval there was a mild pain and tenderness in the described region, but this disappeared and was followed by the production of a small swelling which was not particularly sensitive, but which was likely to be bruised and thereby made intermittently painful. Local examination showed evidence of slight hypertrophic arthritis of the fingers. Situated dorsally over the last interphalangeal joint of the fingers, and somewhat toward the ulnar side, there was a slightly raised swelling about 4 millimeters in diameter, such as is pictured in Figure 1. The covering of this was quite thin and the vesicle seemed to contain a clear fluid, though it was under great tension and was non-compressible. Its base faded away into the normal surrounding skin without an areola of any sort. As a whole it was slightly movable over the underlying tissues. The fact that its fluid could not be pressed out made it certain that it did not communicate with a joint, bursa, or tendon sheath. Under local anesthesia the entire lesion was cleanly and completely excised, without rupturing it. The

Fig. 9. Myxomatous cyst of left middle finger (Case 4).

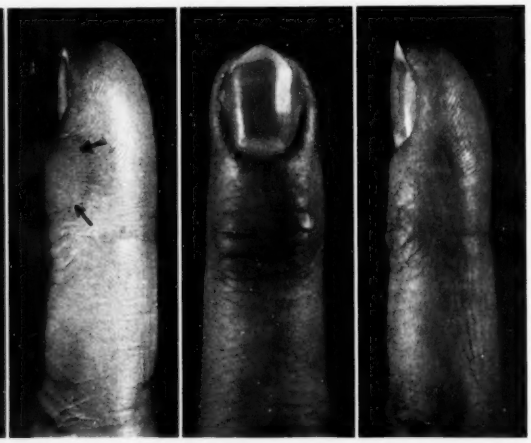

Fig. 10. Same as Figure nine—4 months after x-ray treatments.

wound healed well, but 2 months later a reddening developed in the scar and a slight elevation was evident which strongly suggested beginning recurrence. When seen again 6 months after the operation there was a slight elevation at the operative site, without a definite vesicular appearance. Accordingly, x-ray irradiation was instituted (unfiltered rays—600 r—divided into 2 doses, 2 days apart). Following this the mass disappeared and there is no further evidence of recurrence 1 year after x-ray therapy.

*Pathological examination* showed an elliptical piece of skin in the central part of which was a rounded, raised mass about 5 millimeters in diameter which produced a dome like swelling on the skin surface. The external surface of this rounded structure was smooth and did not have any fissures or hairs. The general character of the lesion was one of an unusual type of dermal cyst, covered by a thin, translucent membrane beneath which could be seen a droplet of clear fluid. In order to preserve the structure and the histological relationships of the mass, it was first fixed in 10 per cent formalin and then a single section was made across it. When this cut was made, a small, well defined cavity was found which was filled with a pale, slightly cloudy mucinous fluid (Fig. 1). The corium of the adjacent skin extended down under the cyst and also a very thin layer traversed its roof (interposed between the cyst proper and the overlying epidermis). Histologically, there was a clearly defined cyst, situated wholly within the derma (Fig. 7). Only a very thin layer of corium was seen between the cyst and the distended, overlying epidermis, but this finding characterized the lesion as being of dermal and not epidermal origin. Epidermal processes extended downward and inward at either side of the cyst (Fig. 8), this arrangement taking place in such a way as to suggest that this might be an attempt on the part of the epidermis to surround the cyst and possibly to extrude it. The inner lining of the cyst was smooth and consisted only of connective tissue of the corium, there being no epithelial lining. Immediately surrounding the cyst cavity the connective tissue of the walls had a loose texture, which is seen best at either end of the cyst (Figs. 7 and 8). Weigert stains for elastic tissue showed a definite decrease in the number and size of the elastic fibers in the loose textured areas immediately adjacent to the cyst cavity. The lesion appeared to be completely excised (yet there was recurrence as noted above).

Case 4. J. B. was a 50 year old white woman who complained of a gradually enlarging cystic mass on the left middle finger. This lesion, which had been present for 5 months, was the seat of moderate discomfort when it struck against various objects. Examination showed a fluctuant, cystic, non-tender swelling 11 millimeters long, 9 millimeters wide, and 6 millimeters thick over the dorsomedial aspect of the terminal phalanx which would transmit light. The nail, when viewed from the end of the finger, was flattened and depressed on its medial third. Not recognizing the character of this lesion, we incised it and a clear, myxomatous, colorless substance was evacuated. By expressing the contents of the cyst a normal configuration of the finger was regained. Within 2 weeks' time the cyst began to reaccumulate fluid and at that time the photograph of Figure 9 was taken. This illustration, therefore, does not indicate the full size of the cyst before the original incision had been performed. Further treatment was instituted by a second incision and drainage 2 weeks later, followed immediately by 2 x-ray irradiations (2 days apart), employing unfiltered rays at 140 kilovolts with a total dose of 600 r. With this therapy the lesion had remained cured when seen 4 months later (Fig. 10).

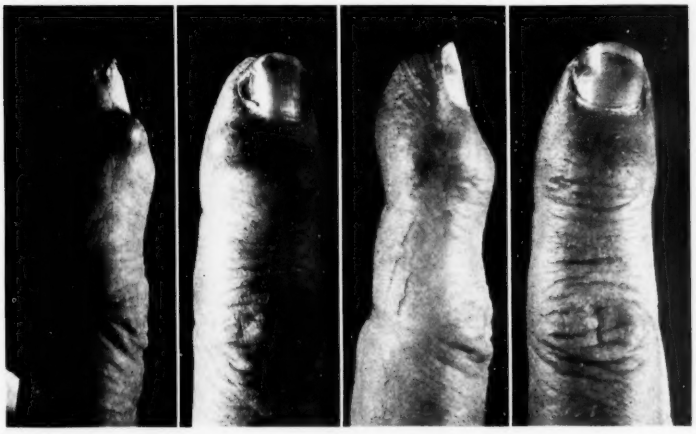

Fig. 11. Left, Myxomatous cyst of corium on right index finger of 1 year's duration (Case 5). In the photograph on the right, notice the depression of the nail which is apparently caused by pressure on the nail bed by the adjacent myxomatous cyst.

Fig. 12. Same as Figure 11—4 months after incision and drainage combined with x-ray irradiation. The distal one-half of the nail is still grooved, but the regenerated proximal half has a normal contour.

CASE 5. E. B. was a 65 year old white woman who complained of a small, hemispherical mass on the right index finger, which had been gradually progressing in size for 1 year and had interfered with her activities as a seamstress. On some occasions there was a local tenderness and pain, but these complaints were less annoying than the inconvenience caused by the swelling. Examination showed evidence of a moderate degree of hypertrophic arthritis of the terminal interphalangeal joint and also the lesion as seen in Figure 11. This mass, located on the dorsomedial aspect of the finger and situated just distal to the articulation, was definitely cystic, transmitted light, and was non-tender. It was slightly fluctuant, smoothly rounded, and had a pinkish tinge. There was a slight grooving of the finger nail on this side, this change being apparently due to local pressure on the nail bed by the overlying cyst. Without performing a biopsy, 2 x-ray treatments were given on 2 subsequent days, unfiltered rays and a total dose of 600 r being used at 140 kilovolts. Since there was no appreciable decrease in the size of the cyst during the next 6 weeks it was concluded that regardless of what change the x-ray treatment had effected in the cyst wall the local swelling would persist until the contents of the cyst was evacuated. Therefore, incision was made into the cyst, the contents expressed, and a normal contour of the finger was obtained. The evacuated material was translucent, clear, glairy, and mucoid. The smooth internal surface of the cyst had a light gray color. A portion of the roof of the cyst was removed for biopsy. Wound healed promptly with no return of the cyst in subsequent 4 months (Fig. 12). The regenerated finger nail developed a normal contour.

*Pathological examination of the specimen* showed the cyst wall to consist only of connective tissue of the corium (Fig. 13). The corium, between the cyst cavity and the overlying epidermis, was essentially normal in appearance. Its collagenous tissue was fairly dense, this change being probably due to x-ray irradiation. The vascularity of the derma was slightly increased, and a few lymphoid cells surrounded the capillary vessels. These two features may also have been due to irradiation. The cyst cavity had no epithelial or endothelial lining. Some of the mucoid material removed from the cyst at operation, which had been fixed in Zenker's fluid, and

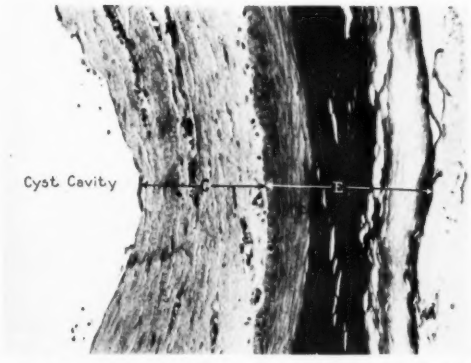


Fig. 13. Photomicrograph of roof of cyst from Case 5 (Fig. 11). The epidermis, *E*, and the corium, *C*, are essentially normal. The cyst cavity, which was filled with mucoid material, does not have any epithelial lining. ×125.

Fig. 14. Left, Myxomatous cyst of right middle finger of 1 year's duration (Case 6). This lesion had been excised on two previous occasions. Right, Same finger 6 months later, following two series of x-ray treatments and subsequent excision and skin grafting. (The grafted area is slightly hyperemic and appears darker in the photograph than does the surrounding skin.)

sectioned, showed an acellular and structureless mucous substance staining blue in the eosin methylene blue sections and a light brown in the phosphotungstic acid hematoxylin stains.

CASE 6. C. K. was a 46 year old librarian who complained of a swelling on the right middle finger of 1 year's duration. Three months after the appearance of this lesion, it had been excised by her local physician and the cyst had recurred in 2 months. Three months after the first operation, the lesion had been again excised but this was also followed by recurrence. Examination disclosed a thin walled, fluctuant sac with a yellowish pink color over the dorsolateral surface of the right middle finger, lying just proximal to the distal interphalangeal joint which was 12 millimeters long, 8 millimeters wide, and 5 millimeters high (Fig. 14, left). This cyst readily transmitted light. Under local anesthesia, an incision with drainage was performed and a small piece of tissue at one edge was removed for biopsy. Two weeks later x-ray therapy was instituted, giving 2 exposures—2 days apart—at 140 kilovolts, unfiltered rays, using a total dosage of 600 r. In spite of this treatment, however, there was recurrence of the cyst, which nearly reached its former proportions in 8 weeks. At the end of the 8 week period, the cyst was aspirated and about 1 cubic centimeter of colorless, clear, mucoid fluid was removed, allowing the cyst to collapse. Further x-ray treatment was immediately given (total dose of 960 r in 2 treatments, 2 days apart, unfiltered rays, at 140 kilovolts). With this therapy the mass gradually reappeared during the next 4 weeks but reached a size only about one-third that of its former volume. The skin surrounding its base was now quite firm and slightly thickened. The entire lesion was then completely excised, and the area was covered with a Thiersch graft. There was no further recurrence (Fig. 14, right).

*Pathological examination of the first specimen* showed, unfortunately, that it had been cut from the cyst wall at a slant so that the inner surface of the cyst was not included in the block. The specimen did contain one thing of interest, however, for in the corium, which must have been quite close to the cyst wall, there was a large, thin walled blood vessel containing an old fibrous but non-vascularized thrombus. It was impossible to determine whether this thrombus was in some way related to the formation of the cyst (by altering local blood supply) or whether it had formed following the previous operative procedures.

*Pathological examination of the second specimen* showed an elliptical piece of skin 1 centimeter long, 5 millimeters wide, and 5 millimeters in maximum thickness. In the central portion of it there was a small vesicular swelling which bulged up on the

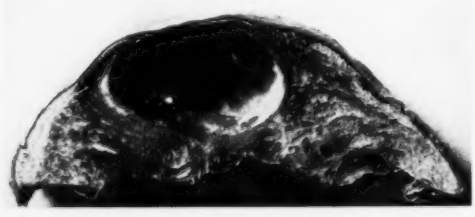

Fig. 15. Photograph of gross specimen in cross section from Case 6. The cyst cavity (which was 4 millimeters in diameter) lay entirely within the corium. A thin layer of the corium can be seen extending over the roof of the cyst, separating it from the overlying epidermis. ×7.

Fig. 16. Photomicrograph of specimen which was removed from Case 6. The cyst has no epithelial lining. The cavity is intradermal in position. In the surrounding derma there was found no evidence of leucocytic reaction. ×15.

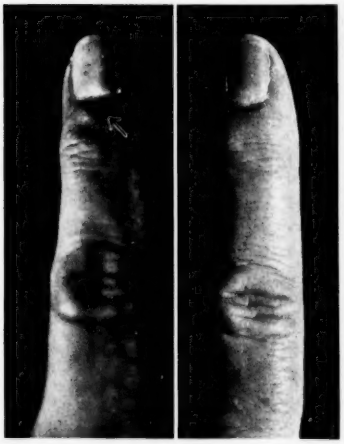

Fig. 17. Left, Small myxomatous cysts of corium on left index finger of 9 months' duration (Case 7). Right, Same, 4 months after incision and x-ray treatment.

skin surface and which apparently extended down into the derma. The external surface of this cyst was thin walled. There was some slight thickening of the skin around the base of the cyst. Examination of the under surface of the specimen showed no sinus or lumen of the cyst; this latter structure was, therefore, believed to have been completely excised and was devoid of communications with other cavities of the finger (such as tendon sheath or joint). Transection of the specimen disclosed a well defined cavity 4 millimeters in diameter in the center of the tissue, which cyst lay within the corium (Fig. 15). Exuding from this cyst were a few droplets of clear, colorless, sticky, glairy, gelatinous fluid. Microscopic examination (Fig. 16) disclosed a cavity without endothelial or epithelial lining, the walls of which were formed by a corium of increased density. The surrounding derma had an increased cellularity, a dense collagenous structure, and only rare infiltrating leucocytes. In the zones 1 to 2 millimeters away from the cyst there were an increased number of dermal blood vessels of capillary size. The density of the corium and the increased vascularity were attributed to previous operative procedures and to x-ray therapy. No communication could be demonstrated from the cyst to underlying structures.

Case 7. (Same patient as Case 6.) For a period of 9 months the patient had noticed a small cyst appearing over the terminal phalanx of the left index finger, for which no treatment had been instituted. Examination showed a small cystic swelling in the midline, on the dorsal aspect of the terminal phalanx of the left index finger, lying just at the base of the nail (Fig. 17, left). This cyst measured 5 millimeters in diameter and was raised 3 millimeters above the level of the surrounding skin. It readily

Fig. 18. Left, Thin walled, translucent, myxomatous cyst of left thumb of 3 months' duration (Case 8). Right, Same, 4 months after incision and x-ray treatment.

transmitted light. The cyst was incised and a small bit of tissue was removed from its wall for biopsy. When the wound had healed, x-ray irradiation was instituted—2 exposures, 2 days apart, 140 kilovolts and unfiltered rays being used, a total dose of 600 r. There was no evidence of recurrence of the cyst in the ensuing 4 months (Fig. 17, right).

*Pathological examination of the biopsy specimen* showed a dense corium of increased cellularity with an abundant amount of collagen. The vascularity and the cutaneous appendages were normal. A few scattered lymphoid cells appeared around one of the smaller vessels. The portion of the cyst wall which was examined did not show a smoothly rounded cavity, but possessed very irregular side arms and outpocketings. The wall of the cavity showed only a connective tissue of the surrounding derma, there being no cyst lining.

Case 8. M. K. was a 49 year old waitress who complained of a swelling on the left thumb of 3 months' duration. During this interval the local mass had gradually increased in size, and while there was no associated pain, the lesion produced some local discomfort when it was bumped against various objects. There had been no known trauma of importance. Examination showed a raised, ovoid cyst over the dorsal medial aspect of the terminal phalanx, quite unrelated to the interphalangeal joint, but lying rather close to the base of the nail (Fig. 18, left). This thin walled cyst had a pinkish yellow tinge and readily transmitted light. It was 7 millimeters long, 12 millimeters wide, and 5 millimeters high. Under local anesthesia, a small transverse slit was made in the dome of the cyst and about 1 cubic centimeter of thick, clear, colorless and gelatinous material was expressed. This operation produced a normal contour to the finger. The interior of the cyst was unilocular, light gray, smooth, and had no outlet to the joint or other structure. The wound healed readily and after 1 week, x-ray treatments were given to prevent recurrence. A total of 600 r was given, dividing this into

2 doses, 2 days apart, at 140 kilovolts and employing unfiltered rays. Four months later there was no evidence of recurrence (Fig. 18, right).

*Pathological examination* of the roof of the cyst and the overlying skin showed findings similar to those seen in the previous cases; namely, a cyst wall unlined by epithelial or endothelial layer, but surrounded only by connective tissue of the adjacent corium. The derma, both adjacent to the cyst wall and elsewhere, was essentially normal in appearance, had an abundant amount of intercellular collagen, and lacked any inflammatory reaction. There was no abnormal vascularity of the corium. The cyst, then, was an unlined structure, lying within the corium, and, because of the absence of mucoid degeneration, of its walls, appeared to have been of considerable standing.

SUMMARY

Clinical and pathological descriptions are made of an uncommon cutaneous condition which is characterized by the formation of a small, recurring, myxomatous cyst of the skin on a finger or toe. The cyst is not lined by a secretory epithelial membrane, nor does it take origin from an adjacent joint cavity, bursa, or tendon sheath. The lesion is a degenerative one, and is produced by a peculiar mucoid change in the connective tissue of the corium, this process leading to liquefaction and cyst formation. The cause for this focal degeneration is unknown, but may have some relationship to local trauma.

Fourteen cases are gathered from the literature for study and 8 additional examples are presented. Twenty-one of the lesions occurred on the fingers, and 1 was observed on a toe. The cysts vary from a few millimeters in diameter to slightly more than a centimeter in greatest dimension. They are commonly located over the dorsal aspect of a distal interphalangeal joint and are usually situated a little to one side of the midline. The cysts are thin walled and contain a colorless, glairy, mucoid, or gelatinous fluid. Three-fourths of the patients were women. The youngest age at which the lesion has been described was 26 years, the oldest 66 years, with an average at 48 years.

These myxomatous cysts of the corium are very resistant to surgical forms of therapy and recur again and again after incision and drainage, curettage, cauterization, or even after local extirpation. Radium or x-ray irradiation affords the best method of treatment and has been found useful in preventing a recurrence.

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# CARCINOMA OF THE JEJUNUM

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ALTHOUGH carcinoma of the jejunum occurs relatively infrequently, it does merit careful consideration. The problem concerns not only a serious lesion but also the accompanying depletion of physical reserve which increases the risk of treatment. For this reason it seems advisable to record our observations in the hope that they may aid in establishing certain criteria for an early diagnosis so that more satisfactory results may be obtained in a larger number of cases.

Of the malignant tumors of the small intestine, sarcomas occur more frequently than do carcinomas. In 1904, Nothnagel reported 243 instances of intestinal sarcoma in 24,358 necropsies; in 6 of the cases the growths were in the ileum and in none of the cases was the growth in the jejunum. On the other hand, Corner and Fairbank, in 1905, reviewed 103 cases of sarcoma of the intestine; in 63 per cent of these cases the growths were in the small intestine and in the majority of the latter cases the growths were in the ileum. The age incidence of intestinal sarcoma is between 30 and 40 years.

Carcinoma has been said to be relatively rare in the portion of the intestine between the pylorus and the ileocecal junction. Hinz, in a study of 584 cases of carcinoma of the intestinal tract, found that the growth was in the small intestine in 18 cases. Bunting reported one instance of carcinoma of the small intestine in 2200 necropsies. Ewing found that 3 per cent of all intestinal carcinomas occurred in the jejunum or ileum. From these reports, it is easy to see that there is a wide variation in the frequency with which carcinoma of the small intestine is found.

D'Allaines, in 1929, collected and reviewed 114 cases of primary carcinoma of the small intestine. Twenty-six of these cases were observed at The Mayo Clinic and were reported from a pathological standpoint by Craig. Rankin and Mayo, in 1929, collected and reviewed 55 cases of verified primary carcinoma of the small intestine, including 24 cases which had been reported by Judd in 1919. In 1935, Plunkett, Foley, and Snell reported 14 additional cases. To these, we wish to add 7 cases in which the diagnosis of carcinoma also was confirmed pathologically at operation or at necropsy. This brings the number of cases of carcinoma of the small intestine, seen at the clinic prior to February 1, 1936, up to 76. We have found 60 other reported cases which bring the total cases in the literature to considerably more than 200. There is no obvious reason why carcinoma should be relatively rare in the small intestine.

Fig. 1. Obstruction in the jejunum which was interpreted as carcinoma (Case 29).

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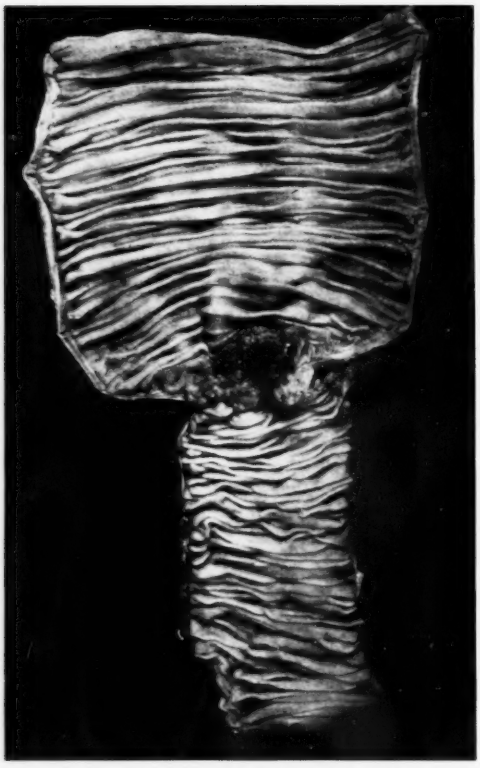

Fig. 2. Carcinoma of jejunum (Case 29).

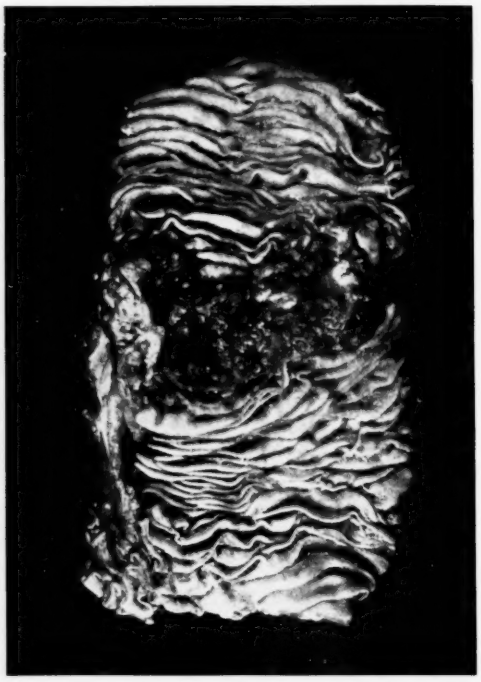

Fig. 3. Resected portion of jejunum in Case 30.

The numerous theories are interesting but far from conclusive. Ewing reported that 8.56 per cent of all intestinal carcinomas originated in the small intestine and that slightly more than half of these originated in the duodenum. In the cases of carcinoma of the small intestine which have been observed at the clinic, the distribution is somewhat different.

In 31 cases, the growth was situated in the jejunum; in 21 cases it was in the duodenum, and in 18 cases it was in the ileum. In 4 cases, carcinoma was present in more than one portion of the small bowel, and in 2 cases the site of the growth was indeterminate. We have reviewed the entire series of cases observed at the clinic and are reporting the findings in the 31 cases of primary carcinoma of the jejunum. We have purposely omitted the cases in which carcinoma of the jejunum was associated with carcinoma of the stomach, colon, and genital tract, and those cases in which carcinoma involved more than one portion of the small intestine. Those cases in which microscopic examination revealed the presence of argentaffin tumors (carcinoids) also have been omitted. We believe that it is only in this fashion that the true clinical picture of carcinoma of the jejunum can be evaluated.

### INCIDENCE ACCORDING TO AGE AND SEX

In this series of cases of carcinoma of the jejunum, 20 of the patients were men and 11 were women. The ages of the patients varied from 34 to 67 years. The average age of the men was 50.25 years and that of the women was 52.5 years. The average age of the entire group was 51 years. In approximately a third of the cases there was a history of carcinoma among some of the blood relatives of the present or preceding generation.

At the clinic, 2513 cases of carcinoma of the stomach, 2767 cases of carcinoma of the colon, including the rectum, and 25 cases of carcinoma of the small intestine were observed from 1921 to 1930, inclusive. In this same period in 8 of the cases of carcinoma of the small intestine the growths were situated in the jejunum. In this 10 year period 0.47 per cent of all gastro-intestinal carcinomas involved the small intestine. This compares favorably with the incidence of 0.62 per cent reported by Rankin and Mayo in a similar series of cases. In the 10 year period carcinoma of the jejunum comprised 0.15 per cent of the total number of carcinomas of the gastro-intestinal tract. Seventy-six carcinomas of the small intestine have been observed at the clinic; these comprise 0.62 per cent of all carcinomas from the cardiac end of the stomach down to and including the rectum.

## SYMPTOMS

In Table I it may be seen that in about 80 per cent of the cases there was a rather typical clinical history of a lesion of the small intestine. This percentage undoubtedly was increased by carefully questioning the patient after the lesion had been discovered at the time of operation. Such questioning often elicited a typical history. Cramps and epigastric discomfort are most commonly the chief symptoms. Usually, there is a history of recurrent short episodes of intestinal obstruction, associated with cramps, nausea and vomiting. These symptoms occur for 3 to 4 months and tend to become more frequent and more severe. Although there is not always a relationship between the symptoms and meals, the cramps, when present, occur about 3 to 4 hours after eating. "Gas," "rumbling," and "bloating" are common symptoms.

Weakness and easy fatigability are prominent symptoms and a careful history often reveals that these and anemia antedate the gastro-intestinal symptoms. Loss of weight is a prominent symptom and may cause the patient to seek medical advice. There is more constipation than usual and melena and hematemesis occur occasionally. The most important symptoms will be considered individually.

*Colic.* Abdominal pain was an outstanding symptom in 26 cases. It is difficult to evaluate the short cramping type of pain and the more or less constant stationary type of pain, because of the gradations present in both. Localized pain, which varied from dull to moderately severe, was present in 6 cases, while 3 patients complained only of abdominal distress or discomfort. Abdominal cramps were the chief symptoms in 17 cases. The site of the pain was usually in the epigastrium below the umbilicus, which according to Rivers, corresponds to the site of referred pain caused by lesions in the jejunum. Cramps, when present, were prominent in this region, as well as across both lower quadrants of the abdomen. There was extreme variation in the duration of colic, which lasted from several seconds to 3 or 4 hours.

*Anemia.* Fatigue, weakness, and general malaise were constant but were frequently secondary to the gastro-intestinal symptoms. Frequently, there was a history of progressive anemia which had not responded to treatment. Laboratory tests showed the anemia to be of the microcytic, hypochromic type. The average number of erythrocytes was 3,730,000 per cubic millimeter of blood. The mean value for the hemoglobin was 59 per cent. Necropsy demonstrated that hemorrhage was the cause of death in Case 12, which was the only case in which operation was not performed. Plunkett and his coworkers have pointed out that the anemia may result from both the occult bleeding and the interference of the absorptive function of the small intestine. In 1913 and 1921, W. J. Mayo called attention to the marked anemia associated with carcinoma of the proximal half of the colon. The marked anemia in these cases of carcinoma of the jejunum is comparable to the anemia associated with lesions of the right half of the colon and may be attributable to some change in intestinal absorption or in activation of the gastro-intestinal hematopoietic substance described by Castle and others.

*Loss of weight.* Loss of weight occurred in all but 3 cases. In 2 of the cases there was no change in weight and in 1 there was a gain of 5 pounds (2.3 kilograms). The average loss was 25 pounds (11.3 kilograms).

*Vomiting.* Vomiting was a variable symptom both in incidence and degree. Frequently, vomiting was self-induced to obtain relief. While vomiting was more frequent when the upper portion of the jejunum was involved, this was not a constant finding since marked vomiting occurred in Case 23, in which the distal portion of the jejunum was involved, and there was an absence of vomiting in Case 11, in which there were several lesions in the proximal portion of the jejunum. The degree of intestinal obstruction appeared to be the main factor in the production of vomiting. There was no history of vomiting in 11 cases; the vomiting was slight or moderate in 9 cases, marked in 9 cases, and extreme in only 2 cases. With few exceptions, it was intermittent and followed the other obstructive symptoms.

*Constipation.* In several cases, constipation was one of the chief complaints but it was a minor symptom in many cases. Constipation was present in more than half of the cases (17) but it never was intractable. Moreover, 6 patients gave a definite history of diarrhea, most commonly a mild diarrhea which alternated with periods of constipation or normal bowel movements. Constipation, while a common symptom, is too variable to be of diagnostic value.

*Melena.* While melena was not a frequent complaint, it occurred in 6 cases.

### SPECIAL TESTS

*Occult blood.* The presence of occult blood in the stool is a very valuable sign and the test should be used more frequently than it is. By this test the careful clinician often obtains the first clew as to the real nature of the patient's trouble. It is striking to note that strongly positive reactions were obtained in all cases in which the occult blood test was employed.

*Gastric analysis.* Gastric analysis was made in 20 of these cases. In 6 there was gastric retention which varied from 370 to 1000 cubic centimeters. Hyperchlorhydria was present in only 1 case, in which the value for the total acid in the stomach was 70, according to the method of Toepfer. Achlorhydria was present in 12 cases.

### ROENTGENOLOGICAL EXAMINATION

The decision as to whether roentgenological examination should be carried out must necessarily be based on the clinical findings. The symptoms of previous attacks are frequently so suggestive of intestinal obstruction that the use of barium (especially by mouth) is not only of little aid but may constitute a definite hazard. Roentgenological examination with a contrast medium has been very useful in demonstrating the absence of lesions of the stomach, small intestine, and colon in cases in which there are present vague, indefinite, gastro-intestinal symptoms and in cases of unexplained anemia. A positive roentgenological diagnosis was made in 10 cases (Cases 6, 7, 14, 22, 23, 24, 27, 28, 29, and 31). Gabor and Hiller have pointed out that retention of barium in the small intestine for more than 8 hours should arouse suspicion.

The roentgenogram of carcinoma of the jejunum reveals a narrowing of the intestinal lumen at the site of the lesion and compensatory widening proximal to the obstruction. Coiling of the intestinal loops proximal to the lesion and distention are frequent findings.

The observation of barium in the small intestine is rather difficult, but the clinical history and the roentgen exclusion of the presence of a lesion in the stomach or colon frequently will furnish presumptive evidence of a lesion of the small intestine. In Cases 27 and 28, x-ray examination of the colon revealed the presence of an extrinsic mass suggestive of a neoplasm of the small intestine.

Figure 1 shows a jejunal tumor which has produced partial obstruction of the intestine. The history in this case (Case 29) was rather indefinite, but the patient had had severe cramps and had noted distention and rumbling in the abdomen. The lesion which was found at operation is shown in Figure 2. The patient had undergone a cholecystectomy a short time before she came to the clinic. A previous roentgenological examination of the intestine, which had been made prior to her admission to the clinic, had not revealed any abnormality.

### DIAGNOSIS

It is neither important nor possible clinically to differentiate carcinoma of the jejunum

TABLE I.—CLINICAL DATA IN 31 CASES OF CARCINOMA OF THE JEJUNUM

| Case Year observed | Age—years—and sex | Principal symptoms | Pounds lost | Duration of symptoms, months | Blood | | | Gastric acidity* | | Site of lesion | Operative and pathologic findings | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Hemoglobin, per cent | Erythrocytes, thousands per cu. mm. | Leucocytes, per cu. mm. | Total | Free | | | |
| 1 1907 | 39 M | Gas, rumbling, cramps | 50 | 3 | | | | 25 | 0 | Upper part of jejunum | Obstruction; carcinoma | Died in 11 months |
| 2 1909 | 40 M | Epigastric pain, vomiting | 25 | 3 | 50 | 4,53 | 6,800 | | | Upper part of jejunum | Obstruction; ascites; metastasis | Unknown |
| 3 1909 | 49 F | Cramps, rumbling, tenderness | 12 | 2½ | 55 | | | | | Upper part of jejunum | Obstruction; peritoneal nodules | Died in 4 months |
| 4 1912 | 46 F | Cramps, vomiting | 20 | 36 | 39 | 3,34 | 5,900 | 48 | 0 | Upper part of jejunum | Large tumor; metastasis | Died in 6 months |
| 5 1913 | 43 M | Cramps, vomiting, weakness | 54 | 10 | | | | 50 | 40 | Upper part of jejunum | Ring carcinoma; metastasis | Died in 22 months |
| 6 1913 | 57 M | Alternating constipation and diarrhea; vomiting | 23 | 9 | | | | 48 | 40 | Upper part of jejunum | "Spool-sized" carcinoma | Died in 12 days |
| 7 1915 | 51 M | Fullness, distress, vomiting | 40 | 6 | 80 | 4,03 | 9,900 | 36 | 22 | Upper part of jejunum | Obstruction; no metastasis | Died in 91 months |
| 8 1916 | 34 F | Epigastric mass, rumbling, pain | 6 | 2 | | | | | | Upper part of jejunum | Obstruction; metastasis | Died in 3 days |
| 9 1916 | 45 M | Pain, vomiting, melena | 20 | 4 | | | 11,200 | | | Middle of jejunum | Obstruction; carcinoma, grade 4 | Died in 14 months |
| 10 1917 | 65 M | Cramps, gurgling | 85 | 24 | 82 | | 7,000 | | | Middle of jejunum | Obstruction; ascites; metastasis | Died in 58 months |
| 11 1918 | 47 M | Cramps, loss of weight | 20 | 2½ | 74 | | | 36 | 20 | Upper part of jejunum | Obstruction; three epitheliomas; metastasis | Died in 4 months |
| 12 1918 | 45 M | Cramps, melena fever | 10 | 2 | 25 | 2,06 | 27,000 | | | Upper part of jejunum | No operation; ulceration; obstruction; metastasis | Died 6 days after admission to clinic; necropsy |
| 13 1919 | 50 M | Pain, vomiting | 20 | 12 | 77 | | 11,200 | 48 | 28 | Middle of jejunum | Obstruction; metastasis | Died in 1 month |
| 14 1927 | 61 M | Vomiting, distress, hematemesis | 20 | 3 | 68 | 3,30 | 8,700 | | | Upper part of jejunum | Obstruction; metastasis; adenocarcinoma | Died in 1 month |
| 15 1927 | 67 M | Fatigue, anemia, melena | 0 | 9 | 36 | 3,10 | 6,000 | 22 | 0 | Distal part of jejunum | Obstruction; annular adenocarcinoma | Died in 12 months |
| 16 1927 | 43 M | Weakness, vomiting | 24 | 8 | 42 | 3,42 | 9,500 | 28 | 0 | Upper part of jejunum | Slight obstruction; metastasis | Died in 5 months |
| 17 1928 | 67 F | Vomiting, pain, rumbling, jaundice | 40 | 4 | 45 | 3,85 | 4,650 | 12 | 0 | Mid jejunum | Obstruction; annular adenocarcinoma | Died in 8 days |
| 18 1928 | 46 F | Cramps, vomiting | 12 | 12 | 75 | 4,54 | 9,300 | | | Upper part of jejunum | Obstruction; colloid carcinoma; metastasis | Died in 11 months |
| 19 1929 | 38 M | Anemia, cramps, vomiting | 0 | 24 | 28 | 3,17 | 6,700 | 94 | 70 | Upper part of jejunum | Obstruction; adenocarcinoma, grade 2 | Alive |
| 20 1929 | 53 M | Distress, cramps, melena | 11 | 6 | 34 | 3,18 | 10,600 | 10 | 0 | Upper part of jejunum | Obstruction; carcinoma, grade 4; metastasis | Alive |
| 21 1929 | 60 F | Diarrhea, cramps, vomiting | 24 | 2½ | 73 | 4,91 | | 32 | 12 | Upper part of jejunum | Obstruction; adenocarcinoma, grade 4; metastasis | Died in 13 months |
| 22 1931 | 59 M | Backache, discomfort, weakness | 36 | 5 | 71 | 4,32 | 9,800 | | | Upper part of jejunum | Obstruction; carcinoma, grade 3, metastasis | Died in 2½ months |
| 23 1931 | 49 F | Cramps, rumbling, vomiting | 30 | 7 | 71 | 4,90 | 6,800 | 20 | 0 | Lower part of jejunum | Obstruction; annular adenocarcinoma, grade 2 | Died in 25 months |
| 24 1932 | 46 F | Vomiting, loss of weight | 48 | 5 | 97 | 4,50 | 17,200 | 18 | 0 | Upper part of jejunum | Obstruction; ring adenocarcinoma, grade 2 | Died in 3 days |
| 25 1932 | 45 M | Cramps, mass, vomiting | 15 | 9 | 37 | 3,71 | 7,200 | | | Jejunum | Perforation; obstruction | Died in 11 months |
| 26 1933 | 64 M | Constipation, dull pain, anemia | 15 | 24 | 49 | 3,92 | 10,300 | 10 | 0 | Lower part of jejunum | Obstruction; perforation, adenocarcinoma, grade 4 | Unknown |
| 27 1934 | 43 M | Weakness, loss of weight, anemia | 52 | 48 | 50 | 3,83 | 7,900 | 30 | 24 | Jejunum | Obstruction; metastasis; adenocarcinoma, grade 3 | Died in 4 months |
| 28 1934 | 50 M | Colics, cramps, anemia | 6 | 7½ | 51 | 3,13 | 8,600 | 20 | 0 | Upper part of jejunum | Obstruction; metastasis | Died in 14 days |
| 29 1935 | 67 F | Rumbling, distention, cramps | 24 | 4 | 92 | | 9,100 | | | Upper part of jejunum | Fixed, annular adenocarcinoma, grade 2 | Died in 9 days |
| 30 1935 | 57 F | Cramps, anemia, melena | 5 | 2 | 82 | 4,01 | 3,600 | 50 | 36 | Upper part of jejunum | Annular, ulcerating adenocarcinoma, grade 3 | Alive |
| 31 1936 | 57 F | Cramps, loss of weight, melena | 37 | 8 | 70 | 2,63 | 3,800 | 10 | 0 | Upper part of jejunum | Metastasis; adenocarcinoma, grade 3 | Alive |

*According to method of Toepfer.

and carcinoma of the lower portion of the duodenum or ileum. In a large percentage of cases, symptoms of intermittent intestinal obstruction, symptoms referable to anemia, and additional laboratory tests have been a great aid in the diagnosis of carcinoma of the small intestine in recent years. A positive test for occult blood is a very important finding.

At the age at which cancer occurs, other diseases are often present, which may not only confuse and distort the clinical picture but also may mislead the surgeon unless a careful exploration is performed. In 5 of the cases in this series (Cases 17, 21, 23, 26, and 29) there had been typical attacks of cholecystitis, and gall stones were found to be present at operation. In Cases 2 and 30 (Fig. 3), the patients had duodenal ulcers, and in Case 16 a gastro-enterostomy had been performed previously for a duodenal ulcer, and a rib had been resected because of pneumococcic empyema. A sixth of the patients had been treated previously for anemia, but improvement had not occurred. Diverticulitis, migraine, adenomatous goiter and tuberculous scoliosis also were found in some of the other cases of carcinoma of the jejunum included in this report.

### SURGICAL TREATMENT

These cases represent the experiences of 16 surgeons. Resection and entero-anastomosis were the procedures of choice and could be performed in 15 (48 per cent) of the cases. Of the palliative surgical procedures, entero-anastomosis was performed in 11 (35 per cent) of the cases, while gastro-enterostomy was performed in only 2 cases. In 2 cases the abdomen was closed after an exploratory laparotomy, and in 1 case no surgical treatment was given. A detailed description of the surgical technique has been reported previously by one of us (Mayo).

### PATHOLOGICAL CHANGES

The typical tumor is an annular, obstructing adenocarcinoma similar to that found so commonly in the distal portion of the colon. Polyps, which were undergoing malignant degeneration, occasionally were found. A detailed description of the pathological changes in these cases will be reported at a later date. The lesion was situated in the upper part of the jejunum in 22 of the cases and in a surprisingly large number of cases it was situated at or within a short distance of the ligament of Treitz. In 4 cases the lesions were situated in the middle portion of the jejunum and in 3 cases they were in the distal portion of the jejunum. In 2 cases the situation of the lesion in the jejunum was not described.

*Metastasis.* Metastasis is a common accompaniment of malignancy in the small intestine. Metastatic invasion first occurs in the mesenteric lymph nodes and peritoneum, then in the liver, lungs, long bones, and dura mater of the spinal cord, in the order named. Metastasis takes place probably at an early stage and obviously influences seriously the undesirable outlook of lesions in this situation. In a study of 12 cases of jejunal carcinoma Craig found metastasis in all but 1 case. In more than half of the 31 cases which form the basis of this report, demonstrable metastasis was reported by the surgeon or the pathologist.

### PROGNOSIS

The prognosis of carcinoma of the jejunum, like the prognosis of carcinoma in other parts of the small intestine, is unsatisfactory, regardless of whether or not the growth can be removed. To get a general picture of the prognosis the patients have been divided into two groups. The first group, which includes those patients who are living at the present time, consists of only 4 patients. However, 2 of these have lived more than 7 years from the time of operation. In considering the small number of patients who are alive, it should be remembered that the cases have been observed in the course of a great many years. In the second group, in which the prognosis is less favorable, only 2 patients lived more than 3 years since the operation. One of these patients (the patient in Case 7) lived for more than 7 years after the operation and the other patient (the patient in Case 10), who was subjected to a palliative jejuno-jejunostomy, lived in comfort for almost 6 years since the operation. The average length of life for the second group of patients was 17.6 months. Although the patients lived

only a short time, the relief of obstruction and the comfort of the patients seemed to justify the surgical procedures. Perhaps the digestive activity of the jejunum, the abundant supply of lymph, and the high grade of malignancy are important factors in the gravity of the prognosis.

## CONCLUSIONS

1. Carcinoma of the small intestine is infrequent and comprises 0.47 per cent of carcinomas of the gastro-intestinal tract.

2. The jejunum is the most common site for carcinoma of the small intestine, and carcinoma of this region represents 0.15 per cent of all gastro-intestinal carcinomas.

3. Intermittent attacks of intestinal obstruction with progressive anemia, in the presence of normal roentgenograms of the stomach and colon, should suggest primary malignant disease of the small intestine.

4. The presence of occult blood in the stool appears to be a rather constant finding and the occult blood test should be performed in every case in which there is vague abdominal pain.

5. This condition must be kept in mind in any case of unexplained anemia.

6. The operative mortality of carcinoma of the jejunum is 20 per cent, while the average duration of life is 17.6 months following operation.

7. The comfort of the patient justifies the surgical relief of obstruction in the jejunum.

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# THE EFFECT OF THROMBOPHLEBITIS ON THE VENOUS VALVE

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BOTH the pathology and the clinical course of phlebitis might lead one to expect that this disease process should involve the venous valve. It seemed to the authors that the organization of a thrombus must effect some changes in the thin valve flap that lies buried within it. Clinically, we sought in such valve damage the answer to the permanent disability of the post-phlebitic limb (phlebitis of the deep veins). Such disability, manifested by cyanosis, edema, and easy fatigue, may indeed occur and persist even after an adequate lumen is established by recanalization, and even after accompanying varicosities (if they exist) have been cured by ligation and injection. This suspicion of valve damage was strengthened by our observation that varices of the leg may increase in severity if a previously well valved saphenous vein were sclerosed by injection. After such treatment, either recanalization of the saphenous or dilatation of collaterals may occur (3), and one frequently finds a quickly developing reflux of blood in the veins. In other words, one has brought about, or hastened, the valvular incompetence of the trunk that feeds the varices. Still one more observation suggested the thesis of valve damage. Varicose ulcers occurring after phlebitis of the deep veins are especially stubborn and are usually accompanied by incompetence of the valves of the perforating veins. This situation was discerned by Homans, who in 1916 wrote: "In this case the valves are suddenly and universally crippled, possibly by the organization of the thrombus . . . ."

We have been able to find only one direct observation of the venous valve after phlebitis. Beneke (1890) in discussing organization of thrombi, stated that where a thrombus overlays a normal valve, no organization proceeds from the free part of the valve cusp. "But if the valve be fixed in any way, *as by adhesion to a previously organized thrombus* . . . . a true organization can proceed from the valve flap."

We have not been able to find descriptions of the actual events during the active phlebitis. It is interesting, however, to note the description of the destruction of an analogous structure, the lymphatic valve, by Benda (1911). In describing the course of tuberculosis of the thoracic duct, he writes: "The ulceration frequently attacks the valves, and disrupts them into small fragments . . . . The changes are so severe as to make most of the valve disappear." He published a drawing showing the microscopic appearance of the fragmented elastica of the valve lying within the fibrin and caseous tissue.

Because of the paucity of previous observations, we thought it fitting to study the actual histology of the venous valve during the entire course of phlebitis. This paper is a report of this study. The material is partly from the human, and partly from dogs. In the latter a phlebitis was produced by chemical irritation of the femoral vein.

## METHOD OF STUDY

Sixteen dogs were used for the study of the artificially induced phlebitis. Each femoral vein was operated on twice; the phlebitis was produced at the first operation, and the segment of vein containing the valve was excised for examination at the second. The interval between the production of the phlebitis and the excision of the vein varied with each dog, so that the process could be followed through its various stages.

To produce the phlebitis at a valve site, the femoral vein was isolated in the trigone. Here, just below the entrance of the deep femoral

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vein, there is constantly a valve, and in some cases a second one a few millimeters lower. When the vein is stripped free of its sheath, the attachment of the two cusps (the valve is usually bicuspid) is seen as two crescentic, transverse, opaque white ridges, an appearance that we may call the valvular arcade. In order to be sure of including the valve in the future excision, this area containing the valve was demarcated at the very start, since the onset of the phlebitis rendered it impossible to see the arcade at any later time. Accordingly, sutures of heavy linen were placed in the muscle medial to the vein, one above the arcade and one below, demarcating a piece of vein about 1.5 centimeters long. The ends of the sutures were left long and were easily found at the second operation. One or two small tributaries which entered the vein were cut between double ties.

The segment of vein was isolated by gentle clamping above and below, and was injected with a few drops of sodium morrhuate.[1] The vein was flushed out with the sodium morrhuate, and then a little blood was allowed to enter it. We found that leaving in any more of the material diluted the blood to such an extent that the clot was too soft to remain after removal of the clamps. At the beginning of the study a 5 per cent solution was used, which produced only a partial thrombosis. We later changed to a 10 per cent solution, which gave a complete thrombosis. The clamps were left on for 40 to 90 minutes, in order to ensure a good clot, and then removed. The wound was closed by sutures.

At the second operation the demarcated segment of vein was laid bare. We wished all the microscopic sections to be cut uniformly in a longitudinal direction and perpendicular to the plane of the cusps, as in Figure 1. This was accomplished by heeding the orientation of the cusps to surface planes as established in a previous study (4). To ensure this proper orientation, the anterior surface of the vein was marked with ink as soon as the vein was exposed. The demarcated segment was then excised.

Only one human specimen was artificially produced (Figs. 13, 15). In this instance, a good valve was demonstrated in the saphenous in the leg and demarcated by a silver nitrate stain on the skin. The vein was then injected with sodium morrhuate, and this segment of the thrombosed vein was removed 10 weeks later. All the other human veins studied were from patients with spontaneous phlebitis. Some of the specimens were obtained at operation, the others at autopsy. These human specimens could not of course be placed in a chronological sequence as accurately as the dog veins.

While in the case of the veins of the dogs, the placing of the demarcation sutures left no doubt that the sectioned vein had previously contained a valve, yet the actual identification of the cusps was difficult within the mass of clot and organization. This was even more true in the human veins. The use of Verhoeff's elastic tissue stain finally proved that the given segment of vein contained, or had contained, a valve. The valve cusps contain a fine membrane of elastic tissue beneath their contact surfaces. This elastic tissue, when stained, shows up well within the organizing thrombus. Counterstaining with van Gieson's stain further allowed a differentiation of the old collagen of the valve from the new fibroblastic tissue.[2]

## COMPLETE THROMBOSIS

For purposes of clarity we describe the changes under the following headings:

1. Mobilization of the organizing elements.
2. Fibroblastic proliferation.
3. Fragmentation of the valve cusps.
4. Recanalization.

*1. Mobilization of the organizing elements.* The most prominent changes, in this stage, occur at the junction of the cusp and the vein wall, a region which we may call the valve base. Here there is normally a capillary which is small and hardly discernible. With the advent of the irritant responsible for the phlebitis, as well as the irritation of the clot, there comes about a dilatation and branching of this capillary. The vessel becomes really sizable and its branches are traceable into the cusp proper (Figs. 3, 11). In some instances

[1]Supplied by Searle & Co.

[2]With the exception of Figure 1, in all the photomicrographs shown in this paper, the specimens were thus stained.

the irritation caused a diapedesis of red cells or an actual rupture of the capillaries in the cusp, with hemorrhage. This was visible in the bland thromboses of the human and dog specimens, but was most marked in a case of infected phlebitis in a dog.

The passage of the dilated and new capillaries across the base deserves closer examination (Fig. 10). The junction of the elastic laminæ of cusp and vein wall is in the shape of a Y. As one follows the well formed sheet of elastic tissue of the cusp to its lateral extremity, it can be seen to course *distally* in a curve, to run without interruption into the internal elastic lamina of the wall. *Proximally*, however, in the region of the angle, the junction of the two elastic membranes has a different appearance. Here the elastica of the vein wall is more abruptly attached to the elastica of the cusp, this union not being effected by a single membrane, but rather by a coarse network of elastic tissue.

The capillary of the valve is located closer to this proximal junction of the elastic tissue than to the distal, more solid part. When the capillary proliferates, the path of its branches lies directly across the network of elastic tissue. This tissue is thereby broken up further, and thus allows the passage across it of the capillaries, as well as of lymphocytes, macrophages, and fibroblasts (Figs. 3, 10, 11). The distal portion of the elastic junction seems to form a better barrier, and is disrupted to a lesser degree.

*2. Fibroblastic proliferation.* At the same early stage to which the mobilization process pertains, fibroblastic proliferation and organization of the clot has already begun. The earliest appearance of the fibroblasts, and consequent deposit of collagen, is seen in the angle of the valve sinus; and this may well be due to the ease and rapidity with which the capillaries described above can reach it.[1] The organizing tissue fills the angle, immediately binding the proximal part of the cusp to the vein wall. As the organization progresses, it soon fills the entire sinus, causing adhesion of the entire length of the cusp (Figs. 3, 10, 11).

The fibroblasts are at first less plentiful along the contact surface of the cusp, but nevertheless, do cover it. The cusp is thus very soon completely imbedded in the young, vascular connective tissue. During the clotting of the blood the valve may have become considerably kinked and folded. The subsequent contraction of the fibroblasts increases this distortion and causes an adhesion of the folds to each other (Figs. 5 and 12). The cusp is thus shortened (Fig. 10). If the cusps happen to lie close to each other at the moment of clotting, then the fibroblasts along their contact surfaces will cause them to adhere to each other.

The new connective tissue, originally made up of fibroblasts, becomes more persistent with the production, finally, of collagen. This material is distinguishable in many of the older specimens, through the use of van Gieson's stain, and Mallory's connective tissue stain.

*3. Fragmentation of the valve cusps.* All the changes incident to phlebitis focus on this one practical point, the destruction of the valve cusp. The valve collagen is least resistant to the lytic forces and disappears first, but the elastic tissue is tough and can be followed, even though it be in fragments, to the very end of the metamorphosis of the thrombus.

The quickest lysis is by ulceration, a process which is seen only in septic phlebitis (Fig. 4). In ordinary, bland phlebitis, the earliest disruption is that already described at the base. At this same time, the cusp may be torn by hemorrhage from its capillaries, as noted in the previous section.

As soon as fibroblasts and capillaries surround the valve, the cusp is progressively fragmented by these two elements. We do not know exactly how or when the endothelium of the cusp disappears, but the fibroblasts and capillaries are seen in contact with its bare connective tissue, and penetrating into it (Fig. 12). The collagen is seen as small masses of pale staining material, but the elastic tissue can be followed as small sheets which later may also be broken up into small frayed bits.

At this stage the continued growth of the capillaries furnishes a continuing, progressively stronger disrupting force, which will be considered under the next heading.

[1]Beneke used this localization of earliest organization to strengthen his argument that the fibroblasts develop earliest where there is most resistance to the pulling force exerted by a shrinking thrombus

*4. Recanalization.* The organization of any sizable thrombus is always associated with a vascularization of the organizing connective tissue. It is rare, indeed, not to find that many of the vessels have a connection beyond the ends of the thrombus, bridging across from one open part of the vein to the other. And, therefore, while clinically we may speak of the presence or absence of recanalization in a thrombosed vein, we really mean to distinguish between a grossly visible lumen and microscopic channels.

Studying the organizing thrombus, one sees the capillaries develop *pari passu* with the fibroblasts (Fig. 12). By the time the fragmentation has been rendered quite complete, the capillaries have fused into sizable communicating channels. In so doing they push aside both the organized thrombus and valve fragments.

The vein, at the valve site, assumes an appearance which differs not at all from the thrombosed vein at any non-valved part (Fig. 13). The vein wall is thickened by the addition of fibroblastic tissue, and its lumen is crossed by columns of the tissue, separated by the endothelium-lined clefts. These columns gradually become thinner by virtue of the shrinkage of the maturing connective tissue, and by the corresponding increase in size of the intercommunicating blood channels. Staining for elastic tissue demonstrates this material of valvular origin, lying within the connective tissue strands (Figs. 6, 7, and 8). This finding demonstrates conclusively that the segment of vein under scrutiny is actually one which previously contained a valve, for the valve cusps are the only available intramural source of this material. New elastic tissue does, indeed, form in the connective tissue, but only after many weeks, and then it is very much finer in texture and paler in staining quality.

The end-result of the recanalization is the production of a valveless single lumen in the vessel. The lumen, as noted, may be large and therefore clinically important,—or small, and recognizable only by microscopic examination. In those instances in which the valve has very early become adherent to the vein wall, the vessels may more easily traverse the thrombus and may not break the valve up so completely. In such a case, a sizable sheet of its elastic tissue may be found in the thickened intima, lying parallel to the older vein wall (Fig.6).

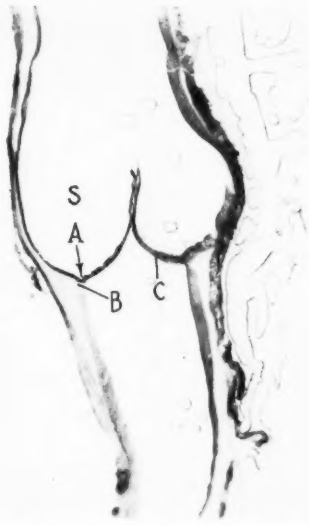
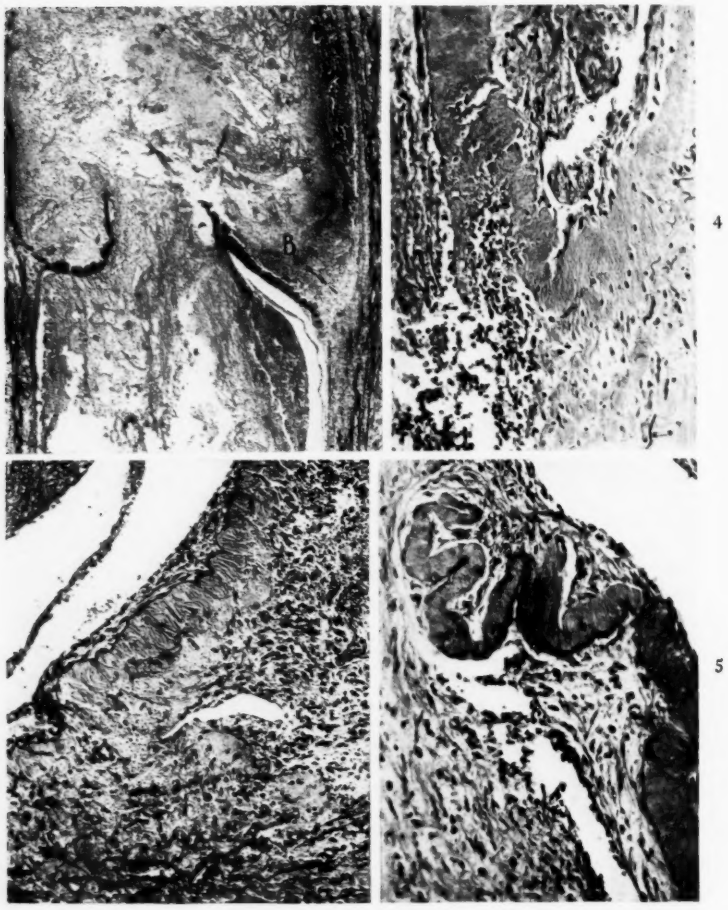



Fig. 1. The human venous valve in fresh, unshrunken condition; longitudinal section. S, Sinus; A, angle; B, base; C, cusp (contact surface). (From Surg., Gynec. & Obst., 1934, 59: 916.)

INCOMPLETE OR PARIETAL THROMBOSIS

Several examples were obtained of the effect of parietal thrombosis on the valve, although we did not demonstrate the sequence in as much detail as in the case of complete thrombosis. The early changes are very similar to those in complete thrombosis; the valve base shows the same dilatation and proliferation of the capillaries and splitting of the junction of the elastica.

The sinus is apt to be well filled with clot from the start. Organization here produces a pad of tissue which narrows the lumen of the vessel (Fig. 14). The cusp will be adherent to this connective tissue for a variable distance, from the angle to its free edge, and indeed may be quite lost within this new intima (Fig. 9). Laterally, in the commissure of the valve, the cusps may become adherent to each other by interposition of fibroblastic tissue (Fig. 14).




Figs. 2 to 5. Photomicrographs in experimental complete thrombosis in the dog.

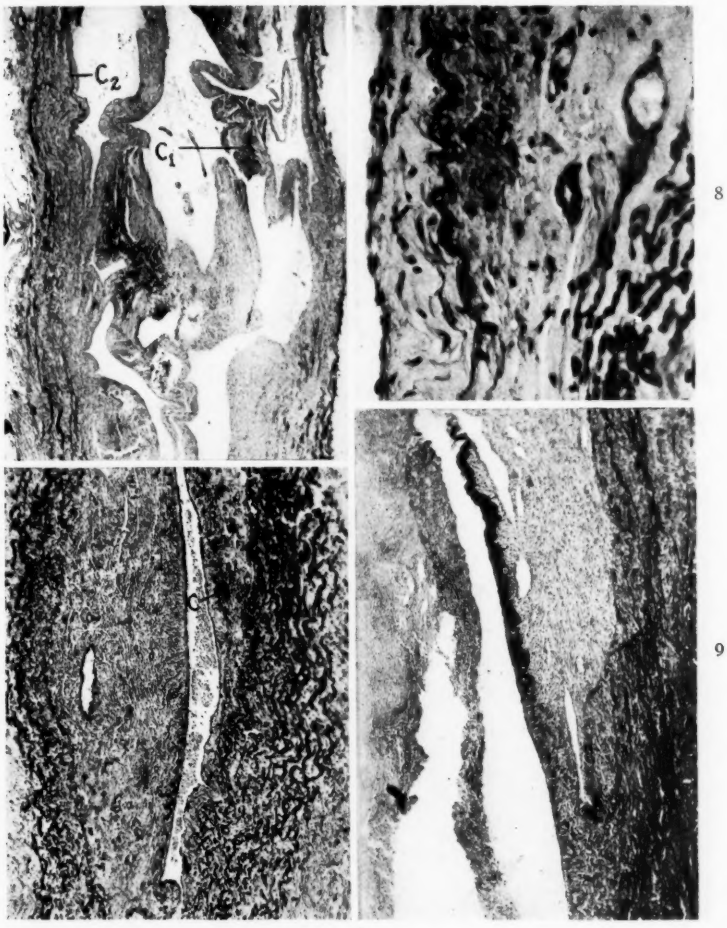
Fig. 2. A longitudinal section of a femoral vein showing both valve cusps in the organizing thrombus. 7 days, ×17.

Fig. 3. The detail of the valve base at *B* of the preceding figure. New capillaries cross the Y junction of the elastica. The contact surface of the cusp is covered by a thin layer of organized thrombus, next to a still intact elastica. The angle is filled with vascular connective tissue, binding the cusp to the vein wall. The fibroblasts enter into crevices of the cusp. ×110.

Fig. 4. Septic phlebitis. There is ulceration of the valve base. 6 days, ×145.

Fig. 5. The free edge of a cusp which has folded on itself and become surrounded by the connective tissue of the thrombus. 8 days, ×145.

In addition to the possibilities of adhesion, the cusp is subjected to further change by the growth of fibroblasts more generally over its two surfaces. Through the addition of this tissue the cusp becomes thickened, and therefore more or less rigid; and through the contraction of this tissue it becomes kinked and shortened, so that it meets its fellow with difficulty or not at all. Such a cusp projecting rigidly into the lumen will hinder the centripetal flow of blood and will be more or less ineffectual in preventing back flow. It can




6 8

7 9

Figs. 6, 7, and 8, Photomicrographs in experimental complete and, Fig. 9, incomplete thrombosis in the dog.

Fig. 6. Recanalization has broken up the thrombus, leaving trabeculæ crossing the lumen. In one of these, at $C_1$, is a small piece of elastic tissue, a remnant of the previously existing valve. At $C_2$ is a longer strip, representing the second cusp. The dark areas in the heavier trabeculæ below are nuclei in the newly-formed connective tissue, and pigment in macrophages. 4 months, ×21.

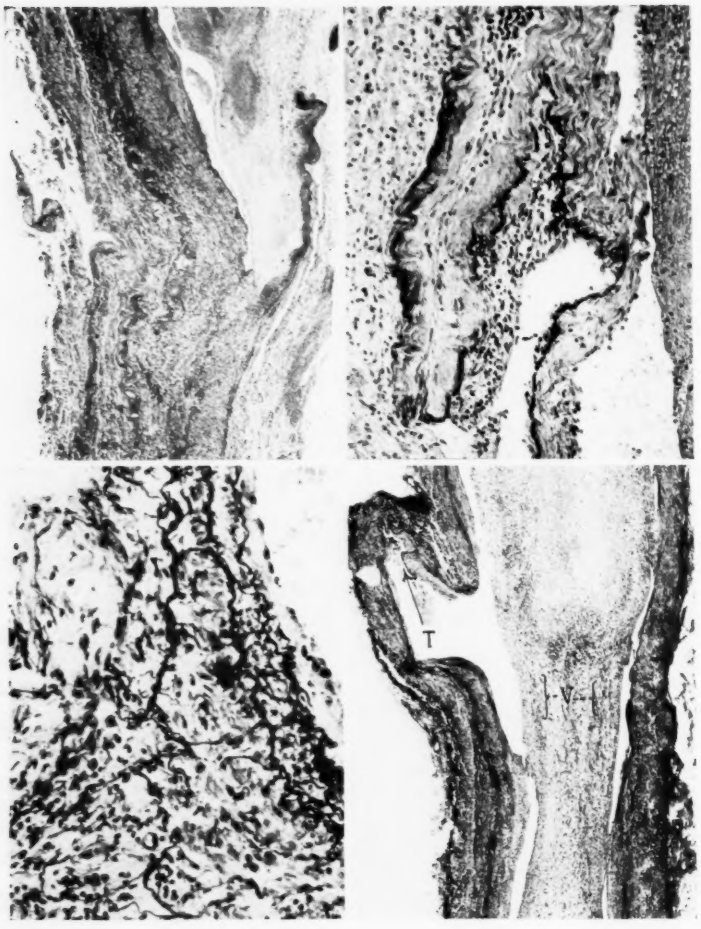
Fig. 7. Further recanalization has resulted in a single, narrow lumen. The vein is now valveless. 7½ months, ×37.

Fig. 8. Detail at area *C* of the vein shown in Figure 7. There is still evidence of a previously existing valve cusp in the shred of elastic tissue buried in the thickened intima. ×250.

Fig. 9. The cusp is adherent to the vein wall by connective tissue which lies along the whole of its sinus surface. Its free edge is thickened and kinked by this tissue. 13½ weeks, ×45.

therefore be said to exhibit stenosis and insufficiency comparable to that shown by the mitral valve (Figs. 15, 16).

As in complete thrombosis, the cusp will be less disrupted if it lies laterally (open) at the moment of thrombosis, and in this position




Figs. 10 to 13. Complete thrombosis in man.

Fig. 10. Femoral vein, longitudinal section. The cusp lies imbedded in the organizing thrombus. The sinus is filled with maturing connective tissue, which effects adherence of the cusp to the wall. There is some kinking of the cusp, maintained by the new tissue; as well as shortening, which is evidenced by wrinkling of the elastica in its mid portion. ×11.

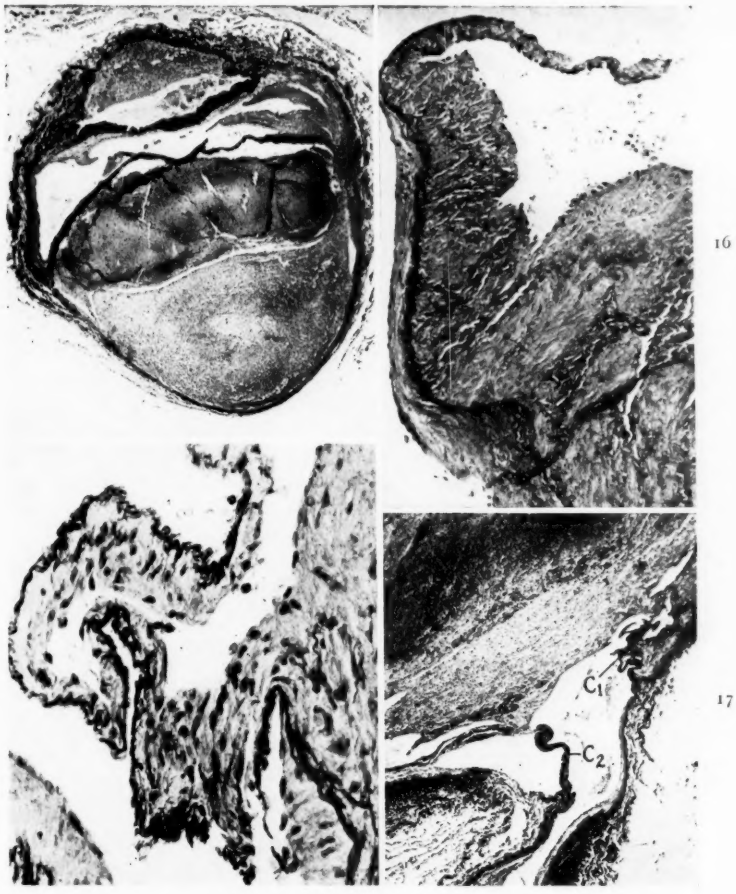
Fig. 11. Detail at valve base of an iliac vein, cross section. The structure is disrupted by newly formed capillaries, lymphocytes, and fibroblasts. ×165.

Fig. 12. Detail of the mid portion of the same cusp shown in Figure 11. The cusp is wrinkled and folded on itself, this distortion being maintained by fibroblasts. In some areas, capillaries and fibroblasts enter crevices in the tissue of the cusp. ×100.

Fig. 13. Complete thrombosis of a saphenous vein, and incomplete thrombosis of its tributary, artificially induced, 10 weeks. The main vein shows the enlargement of the valve sinuses, but the cusps have been destroyed. Under higher magnification, some of the valve elastica can be found at areas indicated *V*. The valve of the tributary *T* is involved in an incomplete thrombosis. ×10.5.

may become imbedded within the new thick intima or adherent to it (Fig. 9).

When a vein is completely thrombosed, its tributaries may exhibit a parietal thrombosis.




Figs. 14 to 17. Incomplete thrombosis in man.

Fig. 14. Femoral vein, cross section. The larger sinus is completely filled with clot, more than half of which is organized. When it is all organized, it will make permanent the binding of the valve to the vein wall. The other sinus is less completely filled with organized thrombus, but enough to limit the lateral excursion of the cusp. This cusp is further hampered in its movement: first, by a thickening due to the organization of the thrombus along its contact surfaces, and second, by inter-adhesions between it and its fellow at one commissure. Not only is this valve completely hampered in its closure (insufficiency) but as the cusps are projected rigidly into the lumen, they seriously obstruct the flow of blood (stenosis). This stenosis is further augmented by the adhesions between the two cusps. ×13.

Fig. 15. One cusp from the tributary of the vein shown in Figure 13. The cusp is thickened by the addition of fibroblasts. It also presents a kinking, and shortening, maintained by these cells. ×235.

Fig. 16. One cusp from a saphenous vein (operative specimen). The structure is thickened and shortened by the addition of connective tissue, especially on its sinus side. Here the connective tissue effects an adhesion of cusp to wall. Compare thickness of proximal half of cusp to that of terminal, uninvolved portion. X76.

Fig. 17. A special variety of incomplete thrombosis: the valve of a vein tributary to a completely thrombosed femoral vein. The intima of the tributary is thickened. Both cusps are caught in the organizing thrombus of the parent trunk. Cusp, $C_1$, is entirely incorporated in new tissue; $C_2$, pulled back by adhesion of free edge. ×21.5.

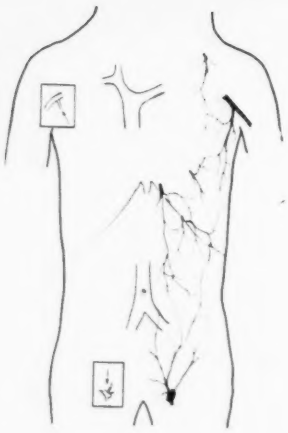


Fig. 18.

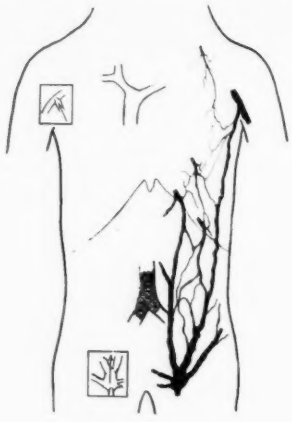


Fig. 19.

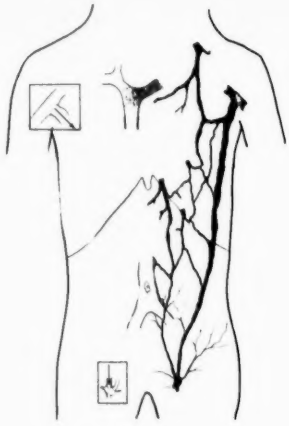


Fig. 20.

Fig. 18. Normal venous drainage of the anterior wall of the trunk. The inserts in the rectangles indicate the direction of the blood flow above, and below, the umbilicus. This direction of flow is ensured by the presence of valves in these veins.

Fig. 19. The direction of venous flow when the veins of the trunk act as collaterals, in obstruction of the inferior vena cava or its main tributaries. The flow takes place *against* the direction of the valves in the *lower* veins.

Fig. 20. The direction of venous flow when the veins of the trunk act as collaterals, in obstruction of the superior vena cava or its main tributaries. The flow takes place *against* the direction of the valves in the *upper* veins. This is made possible by an insufficiency of these valves.

The cusps at the mouths of such tributaries may be involved in such fibroblastic adhesions as have already been described. They may, however, show a special form of crippling due to their being caught in the thrombus of the parent trunk. The entire cusp may thus be caught, and will go through the same destructive process as any cusp lying within a complete thrombus. A variation of this process is the adhesion of only the free edge of the cusp to the thrombus of the parent trunk. The section of such a valve shows its cusps pulled far back from the axis of the lumen, in such a way as to render the valve absolutely useless (Fig. 17).

Occasionally only one cusp is thus caught while the second may be free. The end stage of such a process is the functional disappearance of one cusp, with a resulting incompetence.

### THE VALVES OF THE COMPENSATORY COLLATERALS

In the preceding discussion it has been stated that some recanalization always occurs, although in some cases it results in only a microscopic lumen in the phlebitic vein. Such a lumen is inadequate, and the blood in its return to the heart must pass through the normal collaterals. These collaterals, especially when they are few in number, are forced to dilate to accommodate a larger volume of blood than they normally carry. When they are deeply placed, these compensatory collaterals are supported by the deep fascia, and dilate only enough to handle their increased blood content.

In a previous work (5) the length of the valve cusp that is actually in contact with its fellow, was measured, and found to be from 0.2 to 0.5 of the diameter of the vein, as measured across its center, at right angles to the cusps. Taking into account the fact that there are two cusps, it is seen that they cannot meet, as soon as the vein has dilated an equivalent to from 0.4 to the whole of the original diameter (Fig. 1).

If we consider that the *deep* collaterals, when they are compensatorily dilated, measure two or more times their original diameter, then it is evident that the valves of such collaterals are incompetent. This is analogous to incompetency of an aortic valve when

syphilis causes a dilatation of the aortic ring. The *superficial* compensatory collaterals are not supported by a firm fascia and dilate beyond their needs for blood carrying. In superficial collaterals, therefore, the valvular incompetence is apt to be even more marked than in the deep veins.

This valvular incompetence is evident on inspection of the veins lying on the anterior wall of the trunk, when they are dilated compensatory to a phlebitis of a vena cava, or a femoral or iliac vein. These superficial veins are divisible into two groups (Fig. 18): those above the umbilicus, which drain into tributaries of the superior vena cava via the internal mammary, intercostal, and long thoracic veins; and those below the umbilicus, which drain into the tributaries of the inferior vena cava via the superficial epigastric, circumflex iliac, and pudendal tributaries of the saphenous vein.[1] These two sets of veins are supplied with valves which direct the blood coming from below the umbilicus downward, into the upper end of the saphenous vein; and the blood from above the umbilicus upward, into the veins tributary to the superior cava.

Whenever there occurs a thrombosis of the inferior cava, or the iliac or femoral veins, with inadequate recanalization, these surface veins dilate, and act as compensatory collaterals. The ability of these veins to act thus depends upon a preliminary dilatation of the vein, with a resultant valvular incompetence, for the blood in the inferior group of veins must now run upward against the direction of the valves. This reversal of blood flow does, indeed, take place (3), and it can be demonstrated by inspection or by roentgen ray visualization (Fig. 19). An analogous situation obtains when there has been obstruction to the superior vena cava or its tributaries (Fig. 20).

On the few occasions when we have been able to examine such collaterals at operation or postmortem, we have not been able to locate the valves of these veins. They evidently undergo a process of degeneration, the mechanism of which we are not ready to explain.

[1]Medially, the para-umbilical veins, and laterally the lumbar veins, constitute additional potential channels.

## SUMMARY AND CONCLUSIONS

Phlebitis, with the organization and recanalization of its attendant thrombosis, has a profound effect on the valves of the involved veins.

Complete thrombosis produces, actually or functionally, a valveless vein. Should the cusp be projecting into the lumen (closed position) at the time thrombosis occurs, it lies in the very center of the organization process. Here it is a passive structure, fragmented by hemorrhage and inflammatory exudate; made adherent to the vein wall at the sinus, and to its own folds and to its fellow cusp, and traversed by capillaries and fibroblasts. As organization proceeds, the capillaries widen and coalesce, constantly increasing the fragmentation of the cusp. By the time the capillaries have formed sizable channels, the cusp is no longer existent. Only fragments of its elastic tissue can be found in the trabeculæ which separate the lumina. When, finally, there is produced a single lumen, only occasional traces of this elastic tissue can be found in the irregularly thickened intima, to mark the site where the valve previously existed.

Should the cusp be near the wall at the moment of thrombosis (open position) the earliest organization binds it to the intima. Here the later changes of organization and recanalization disrupt it less than in the former case. But this vein is functionally just as valveless, since the cusp can no longer project into the lumen.

In the case of incomplete, or mural thrombosis, there may result changes in the cusps, comparable to stenosis and insufficiency seen in the heart valves. Fragmentation of the cusp is minimal and usually limited to the base. More important, however, is the addition to the cusp of new connective tissue, which binds its proximal part to the vein wall, and thickens and shortens it along some, or all, of its length.

Stenosis may also be occasioned by the organization of the thrombus in the valve sinus, producing a pad of tissue which does not allow the cusp to open widely.

As in complete thrombosis, the cusp may be rendered functionless by adhesion of its entire length to the vein wall.

A special form of adhesion with resultant insufficiency is seen in the valve guarding a tributary, which leads into a vein undergoing complete thrombosis. In this case one or both cusps may be caught in the thrombus of the main trunk, by the free edge or in the entire length. The organization will destroy these cusps, or pull them far apart and maintain them in a constant open position. Such a condition is exemplified in the valves of the perforating veins of the leg, when a thrombus involves the deep veins.

When recanalization does not proceed sufficiently to form an adequate lumen, the collateral veins dilate to take over the blood flow. Such dilatation produces a necessary insufficiency of the valves of these collaterals. This is exemplified in the veins of the trunk when there is an occlusion of either vena cava.

We feel that in these studies we have found at least one of the reasons which is reponsible for the poor venous circulation which follows phlebitis.

It is a pleasure to acknowledge the help and advice given us in this study by Dr. Frederic Parker, Jr.

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# SKIN HYPERESTHESIA IN ACUTE SALPINGITIS

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SKIN hyperesthesia has been almost entirely neglected in gynecology. Skin sensitiveness is known to occur in acute inflammations of some of the abdominal organs, notably the appendix and gall bladder. It is reasonable to assume that hyperalgesia may be associated with acute inflammations of the fallopian tubes also. Accordingly, a large series of cases of acute salpingitis, as well as other pathological conditions of the internal female organs have been studied to determine the frequency and exact distribution of skin hyperesthesia.

A review of the literature readily discloses the meager knowledge concerning the occurrence of skin hyperesthesia in diseases of the female internal genitalia. Robinson (1908) cities 4 cases of salpingitis and pyosalpinx and 1 case of ruptured ectopic gestation which failed to show skin hyperalgesia. Cope (1924) presents 4 cases of salpingitis associated with a "certain amount of pelvic peritonitis," 2 of which showed skin hyperesthesia. Two cases of inflamed ovarian cysts also reported by Cope showed a "small area of hyperesthesia." Livingston (1932) reports having observed 4 cases of acute tubal conditions with definite hyperalgesia. Pottenger (1922), in his text *Symptoms of Visceral Disease* merely mentions that the skin may become sensitive in some affections of the ovary. Sherren (1903) and Ligat (1919) in their observations on cutaneous hyperesthesia fail to mention any pathological condition of the female genitalia which may show changes in skin sensitivity.

The paucity of observations on skin hyperesthesia in affections of the female pelvic organs is apparent. Obviously many errors are still made in differentiating acute inflammatory conditions of abdominal organs, particularly the appendix, from acute tubal affections or ectopic tubal gestation. Studies on the frequencies but above all the exact distribution of skin hyperesthesia in disorders of the fallopian tubes may afford another clue in the differential diagnosis.

*Innervation of the fallopian tubes. 1. Efferent neurones.* The motor fibers to the tubes are derived from the ovarian plexus and the uterovaginal plexus. Nerves to the ampulla are given off from branches of the ovarian plexus passing to the ovary while those to the isthmus come from the uterine branches of the uterovaginal plexus (Morris and Jackson). The ovarian plexus arises from the intermesenteric and renal plexuses overlying the abdominal aorta. The ovarian plexus then continues downward into the pelvis closely following the course of the ovarian vessels. Besides supplying the ovary it sends fibers to the fallopian tubes and broad ligament and communicates with the uterovaginal plexus within the broad ligament (Kuntz, personal dissections).

*2. Afferent neurones.* The afferent fibers pursue a course similar to the efferent nerves with the exception of a detour via the posterior roots to reach the sensory nerve cells in the posterior root ganglion. The afferent fibers from the ovary traveling along the ovarian plexus reach the cord at the level of the tenth thoracic segment. Kuntz believes that the afferent fibers from the uterus and tubes run through the superior hypogastric plexus (presacral nerve). However, recent experiments on the course of the sensory nerves of the ovarian plexus in the cat show that afferent fibers from the tubes also course through the ovarian plexus (Labate and Reynolds—1936). The afferent fibers from the isthmic portion probably follow the course of the efferent fibers through the superior hypogastric plexus.

It is generally believed that the afferent fibers from the tubes enter the cord at the levels of eleventh dorsal to first lumbar segments (Kuntz and others). The distribution of skin hyperesthesia in acute salpingitis, as will be reported in subsequent paragraphs,

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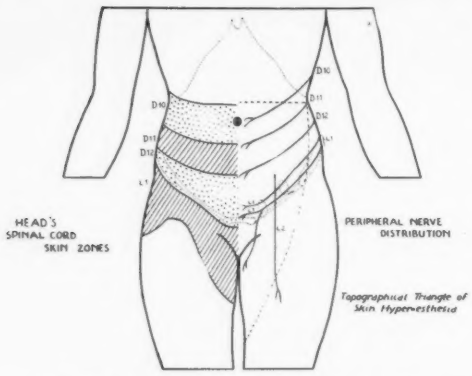


Fig. 1. Relation of topographical triangle of skin hyperesthesia to the areas of distribution of Head's cord segments involved in tubal diseases. The distribution of peripheral sensory nerves is shown on right and Head's skin zones are depicted on the left.

includes the surface of the abdomen corresponding to the cutaneous distribution of the pain fibers issuing from the tenth dorsal. This may be due to a process of diffusion of skin tenderness. But since, as mentioned, afferent fibers from the tubes have been found to run in the ovarian plexus, it may be possible that some of the afferents from the tubes also enter the cord at the tenth dorsal.

*Cutaneous sensory distribution corresponding to the tenth dorsal to first lumbar.* Head (1893) marked the whole of the body and limbs into areas each of which corresponded to the "cutaneous distribution of the pain fibers given off from one segment of the cord." Figure 1 illustrates the areas of cutaneous distribution of the pain fibers given off from the segments of the cord from tenth dorsal to first lumbar which are involved in affections of the fallopian tubes. The areas corresponding to the cutaneous distribution of the pain fibers given off from the tenth dorsal and first lumbar segments are found to involve the entire lower abdomen and a portion of the upper part of the thigh (Fig. 1). Actually, however, the areas are never found to be so sharply delimited.

Subsequent writers have altered this distribution. Thus Head's first lumbar region corresponds more closely to that which Thorburn and others have assigned to the second umbar. Anatomical dissection has shown that the first lumbar is mainly distributed above the line of Poupart's ligament, where Head has the twelfth dorsal and that only a portion of its area lies below the ligament on the front and inner side of the thigh. Finally Thorburn places the umbilicus no higher than the lower part of tenth dorsal. Rudinger shows the umbilicus at eleventh dorsal, Quain between the tenth and eleventh dorsal; Schwalbe opposite tenth dorsal and Patterson claims it lies between the tenth and eleventh dorsals (as quoted by Thorburn).

MacKenzie (1893) contradicted Head's sharp delimitation and claimed that reference of pain was along the course of peripheral nerves "whose root was in intimate association with the root of the sympathetic nerves that supplied the affected organ." Thus he explained the overlapping of sensory fields since he noted that "in very few of the cases could the field of hyperesthesia be delimited with certainty." Ligat (1919) also found that the "hyperalgesia was never distributed evenly over any one segmental area." In the present study, maximal points of tenderness and skin hyperesthesia were observed but no complete limitation according to Head's segmental zones.

*Theories concerning the production of skin hyperesthesia.* Skin hyperesthesia is an altered response to stimulation of the skin surface due to some disturbance within an internal organ. It is produced through a viscerosensory reflex, the afferent component being situated within the disturbed viscus. Ross in 1888 elaborated his theory of referred pain which is similar to the so called MacKenzie theory, but insisted on the presence of visceral (splanchnic) pain. Studies of viscerosensory phenomena were made independently by MacKenzie (1893) and Head (1893). The former elaborated the theory that viscerosensory phenomena were due to an overflow of sensory impulses from the sympathetic afferent component to involve certain cerebrospinal sensory roots with which it comes in contact within the central nervous system. "If we consider that a stimulation arises in an organ and is transmitted by afferent nerves to a more central situation and if this stimulation be of sufficient force or of the proper quality to affect certain nerve roots with which it comes in contact, then,

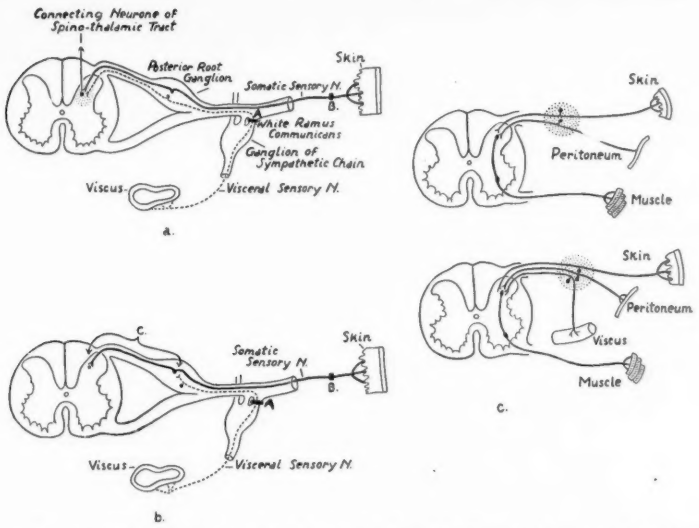


Fig. 2. a, Mechanism of referred pain, the Ross-MacKenzie theory. Afferent impulses pass through the visceral sensory neurone by way of white ramus communicans to connecting neurone of the spinothalamic tract and are interpreted by higher centers as coming from somatic sensory nerve which also connects with the spinothalamic tract. Visceral pain may be interrupted by blocking nerve at *A*. But this theory fails to explain how a block at *B* relieves pain. (After Woodbridge from LeMaire.)

b, Mechanism of referred pain, the Edinger LeMaire theory. Portion *C* of the somatic sensory nerve is supposed to be interpolated in the course of afferent visceral impulses. LeMaire assumes that a block at *B* affects the proximal as well as visceral portion of the somatic sensory nerve and so stops transmission of afferent visceral impulses at *C*. (After Livingston from LeMaire.)

c, Relation of afferent fibers from the parietal peritoneum and from the viscera in the causation of localizing abdominal signs and symptoms. (After Livingston from Morley.)

according to the function of the nerve root there will arise phenomena peculiar to the organ stimulated" (MacKenzie) (Fig. 2, a).

Head presented his ideas of referred pain as being due to an irritable focus within the spinal segment set up by a bombardment of afferent impulses from the disturbed viscus. "Then," states Head, "a stimulus applied to the skin over the area supplied by the nerve roots belonging to this segment will be exaggerated and a stimulus which normally perhaps was only uncomfortable would now appear very sensitive."

LeMaire (1926) believes that an actual synapse occurs within the dorsal root ganglion between the visceral and somatic afferent neurones. From this point of union the stimulus is then carried centrally from the dorsal root along a common pathway (Fig. 2, b).

Finally Morley (1931) states that pain resulting from visceral disease is referred to a somatic cutaneous area only when the parietal peritoneum is involved (Fig. 2, c).

## METHOD OF STUDY

Every patient admitted to the gynecological wards of Bellevue Hospital with an admission diagnosis of salpingitis through a period extending from July to December, 1935, was examined carefully for skin hyperesthesia.

*a. Technique.* Skin hyperalgesia can be elicited accurately only if a proper and adequate stimulus is applied. Various methods are available for testing for skin tenderness. Robinson (1908) and Cope (1924) pinched lightly very small portions of the skin with the finger tips and stroked the abdomen with the head of a common pin. Sherren (1903) gently

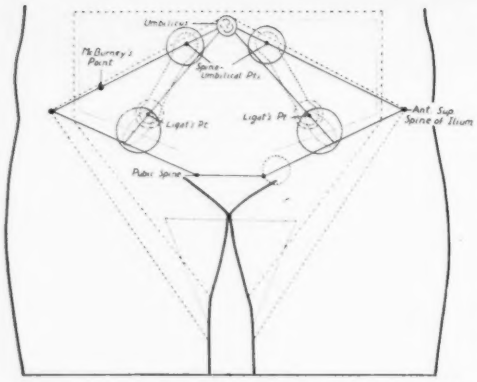


Fig. 3. Composite drawing of different areas of skin hyperesthesia found in acute salpingitis. The bands and circles between and around the spino-umbilical and Ligat points are the sites most frequently involved and the sites of maximal skin hyperesthesia. Note the extent of skin hyperesthesia into the thighs which occurred in 9 cases.

stroked the skin. Ligat grasped the skin and subcutaneous tissues between the finger and thumb and applied traction from the deeper layers of the abdominal wall. Livingston used a vigorous pinch of sufficient intensity to produce discomfort on normal skin. The use of heat and cold or deep scratching with a dull instrument are other methods which may be used.

The milder forms of testing, such as stroking the skin with a dull instrument, heat and cold, and light pinch, were used early in this study but were found to be inadequate. An adequate stimulus must be applied in order to elicit skin hyperesthesia accurately. Therefore we combined traction with a vigorous twist. The skin and subcutaneous tissues were grasped between the thumb and forefinger, care being exercised not to exert any downward pressure on the deeper structures. The skin was then pulled straight out simultaneously exerting a vigorous twist. A preliminary stimulus of a similar nature was applied first over an uninvolved area of the skin to determine the patient's pain threshold. This initial pull was used as a standard of intensity and pulls of equivalent intensity were used over the entire abdomen. Every part of the abdomen was tested carefully beginning over uninvolved areas and systematically working toward the area of sensitiveness. Thus the total area of

TABLE I.—SKIN HYPERESTHESIA IN ACUTE SALPINGITIS

| Cases | Positive | | | | Slight or absent | | Per cent |
|---|---|---|---|---|---|---|---|
| | Exquisite | | Moderate | | | | |
| | No. | Per cent | No. | Per cent | No. | Per cent | |
| 53 | 26 | 49 | 15 | 28.3 | 12 | 22.7 | 77.3 |
| Skin hyperesthesia in mild (subacute or chronic) salpingitis | | | | | | | |
| 10 | 4 | 40 | 2 | 20 | 4 | 40 | 60.00 |
| Skin hyperesthesia in tubo-ovarian abscess | | | | | | | |
| 8 | 0 | | 0 | | 0 | | 0 |
| Skin hyperesthesia in pelvic cellulitis | | | | | | | |
| 3 | 1 | | 1 | | 0 | | |

hyperalgesia was mapped out at the same time noting the points of maximum sensitivity.

A parallelogram was outlined on the abdomen of every patient. A line was drawn from the umbilicus to the anterior superior spine of the ilium. Another line connected the anterior superior spine of the ilium with the spine of the pubis. The process was repeated on the side opposite (Fig. 3). Within this diagram McBurney's and Ligat's points were plotted. The relation of the areas of maximal skin hyperesthesia to the fixed points corresponding to the umbilicus, the anterior superior spine of the ilium, and the spines of the pubis were studied accurately in each patient.

*b. Evaluation of the sign.* The elicitation of pain was used as the criterion of increased sensibility. Only when traction of the skin caused definitely demonstrable discomfort as evidenced by wincing of the patient or by her attempt to brush away the examiner's hand was any credence placed on the sign. Skin hyperesthesia was considered positive only when unquestionably present. Slight or questionable response was considered negative.

The following factors may confuse the interpretation of skin hyperesthesia. (1) There is a certain amount of discomfort when the skin over the abdomen is pulled normally. (2) Extreme deep tenderness will cause the patient to cry out with pain unless extreme care is taken to grasp only skin and subcutaneous tissues. (3) Distention makes it difficult to pick up the skin without exerting downward

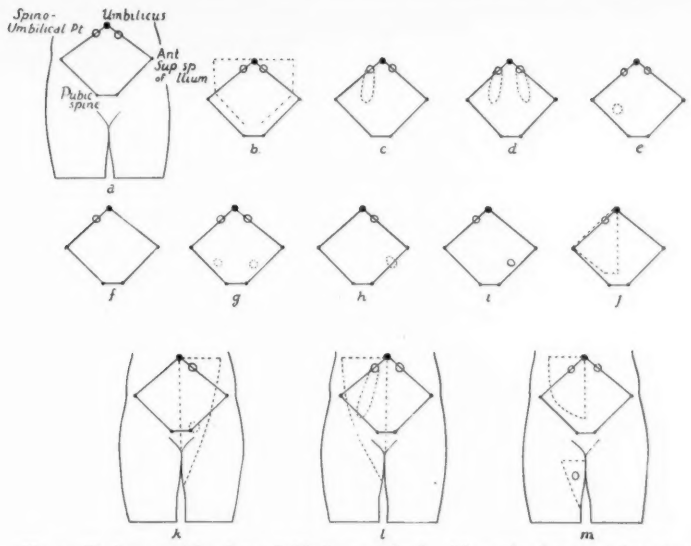


Fig. 4. Various combinations of skin hyperesthesia with maximal areas at the spino-umbilical point. The dark circles signify areas of maximal hyperesthesia and the areas within the dotted lines denote total distribution of skin hyperesthesia.

pressure on deeper structures. (4) Obesity makes accurate localization of skin hyperesthesia more difficult because only large areas of the skin can be grasped at one time. (5) The hyperesthetic patient will cry out or complain even when no real hyperesthesia is present. (6) Tender and enlarged inguinal lymph nodes will give a false positive sign and the area of maximal hyperesthesia may be falsely localized here.

## RESULTS

*a. Skin hyperesthesia in acute salpingitis.* Fifty-three patients with acute salpingitis were examined and of these 26 or 49 per cent showed exquisite skin hyperesthesia while 15 or 28.3 per cent had moderate hyperesthesia. Thus 77.3 per cent of the patients showed positive skin hyperesthesia. In the 12 remaining or 22.7 per cent skin tenderness was not elicited (Table I).

The total extent of skin hyperalgesia varied markedly in individual cases. In 77 per cent of the positive cases hyperalgesia was bilateral, but symmetrical areas were not necessarily involved. Hyperesthesia occurred either over a wide area involving one or both lower quadrants or, as happened most frequently, over small zones involving only segments of the lower abdominal cutaneous surface (Fig. 3). Figure 3 represents a composite drawing of different areas of the abdomen which may be sensitive in acute salpingitis. The skin surface which may become hyperesthetic will be seen to be quite extensive and may involve all or small parts of the lower abdomen below the umbilicus, internal to the anterior superior spine of the ilium and above Poupart's ligament. The total area of the skin hyperalgesia associated with acute salpingitis may be represented by a quadrangle which is bounded above by a line drawn horizontally from the umbilicus, limited below by Poupart's ligaments and laterally by a perpendicular line drawn internal to either anterior superior spine of the ilium. In a few instances skin hyperesthesia will extend into the thighs. It must be emphasized, however, that this entire area may not be involved and that it may not be equally hyperesthetic throughout. Several areas of maximal skin hyperesthesia are always found. In fact in many of the patients examined skin hyperesthesia was demonstrated only at the so called maximal points (Figs. 4 to 6).

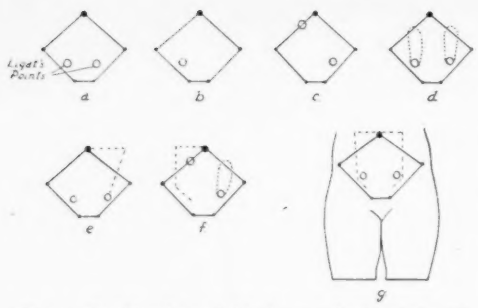


Fig. 5. Combinations of skin hyperesthesia with maximal area at Ligat's point.

Table II shows the sites of maximal skin hyperesthesia as determined in this study. The position of the spino-umbilical point, is described as an arbitrary point 2.5 centimeters lateral to the umbilicus on a line drawn from the anterior superior spine of the ilium to the umbilicus. The maximal area of skin hyperesthesia was localized at the spino-umbilical point in 50 per cent of the positive cases. The skin over this area may become extremely sensitive, a light grasp being sufficient to cause the patient to wince or cry out with pain. Hyperalgesia may diffuse downward from the spino-umbilical point in the form of a narrow band as shown in 16.7 per cent of the positive cases. In this connection it is interesting to note that Ligat (1919) stated that spread from the maximal point occurs "in a vertical direction, the hyperesthesia almost always extending further in a downward than in an upward direction."

In 12.7 per cent of the positive cases, the maximal area of skin hyperesthesia was found at Ligat's point. In a smaller number, skin hyperesthesia was found to be maximal at the spino-umbilical point on one side and at Ligat's point on the opposite side. Table II shows the different areas of maximal skin hyperesthesia that were found (Fig. 7).

Skin hyperesthesia in many cases of acute salpingitis may be demonstrated only at these maximal sites. However, careful examination in many cases may show an associated area of skin tenderness of less intensity which may involve variable portions of the lower abdomen (Figs. 3 to 6). The most acute case of acute salpingitis with high temperature, leucocytosis, elevated erythrocyte sedimentation rate, and pelvic peritonitis may fail to develop skin hyperalgesia. *Skin hyperesthesia occurring over the described maximal areas particularly at the spino-umbilical point is characteristic of acute salpingitis* but must not be relied upon solely to make the diagnosis. It must be stated emphatically that *the absence of skin hyperesthesia has no negative value.* The greatest value lies in the location of the maximal areas of skin sensitivity since in acute appendicitis also, hyperesthesia is found in the right lower quadrant and in ureteral colic hyperesthesia is elicited within the inner surface of the thigh. But in acute appendicitis the area of maximal skin hyperalgesia is at McBurney's point, and in ureteral colic the maximal area will be found in the thigh (Livingston). Acute salpingitis never produces skin hyperesthesia which is maximal at McBurney's point or in the thigh.

TABLE II.—SITES OF MAXIMAL SKIN HYPERESTHESIA IN ACUTE SALPINGITIS

| | Cases | Per cent |
|---|---|---|
| Spino-umbilical point | 29 | 50 |
| Band from spino-umbilical point diffusing down to Ligat's point | 8 | 16.7 |
| Spino-umbilical point on one side—band on other | 2 | 4.1 |
| Spino-umbilical point on one side—Ligat on other | 2 | 4.1 |
| Band on one side—Ligat's point on other. | 1 | 2.07 |
| Ligat's point | 6 | 12.7 |

A glance at Figure 3 will show that the total area of skin hyperesthesia is represented as extending into the thighs. In 9 cases of acute salpingitis, hyperalgesia was observed in the inner aspect of one or both thighs, roughly medial to the sartorius muscle. The sensitive zone was never maximal and usually involved an area 4 to 8 centimeters in diameter at a variable distance below Poupart's ligament. The pressure of the bed clothes on the thighs produced sufficient discomfort to cause these patients to complain on rounds. It is also interesting to note that patients with acute salpingitis often had referred pain along the inner part of the thigh, at times extending as far down as the knee.

Two cases of parametritis, one postabortal, the other postoperative, showed skin hyperalgesia over the inner surface of the thighs. One other patient with parametritis had no skin

TABLE III.—POINTS OF MAXIMUM TENDERNESS IN ACUTE SALPINGITIS

| | Unilateral | Bilateral | Total | Per cent |
|---|---|---|---|---|
| Ligat's point | 13 | 18 | 31 | 55.4 |
| Spino-umbilical point | 5 | 7 | 12 | 21.4 |
| Ligat's point on one side—Spino-umbilical point on other | 0 | 10 | 10 | 17.1 |
| Absent maximum tenderness | 0 | 4 | 4 | 7.1 |

hyperesthesia. These cases are mentioned at this time merely to suggest that the presence of skin hyperesthesia over the thighs in acute salpingitis may mean the presence of an associated parametritis, the inflammatory exudate within the broad ligament producing pressure on afferent nerve fibers.

In 55.4 per cent the point of maximal tenderness was at Ligat's point. This is contrary to the location of maximal skin hyperesthesia at the spino-umbilical point in the majority of cases. We may conclude, therefore, that the point of maximal tenderness need not be identical with the point of maximal skin hyperesthesia. In 21.4 per cent deep tenderness was found to be maximal at the spino-umbilical point. In 17.1 per cent maximal deep tenderness was located over the spino-umbilical point on one side and over Ligat's point on the side opposite. No area of maximal tenderness was demonstrated in 7.1 per cent (Table III).

*b. Skin hyperesthesia in mild (subacute or chronic) salpingitis.* Ten patients were observed in this phase of salpingitis. In 4 skin hyperesthesia was exquisite, in 2 moderate, and in 4 no skin sensitiveness could be demonstrated. Hyperesthesia was bilateral in 2 and unilateral in 4. The total distribution and points of maximal skin hyperesthesia were similar to those occurring in the more acute tubal inflammations.

*c. Hyperesthesia in tubo-ovarian abscess.* Eight patients possessing tubo-ovarian abscesses were examined frequently for skin hyperesthesia. In none of the patients could hyperesthesia be demonstrated. The absence of skin hyperesthesia in these patients may be due to the prolonged destructive process of the inflammatory exudate which must involve the terminal endings of the nerves. Anyone familiar with the microscopic picture of a tubo-ovarian abscess will be impressed with the far advanced destruction of the mucous membrane. If, as Ligat believed, the origin of the viscerosensory reflex lies in the mucosa, skin hyperesthesia should fail to appear in these cases.

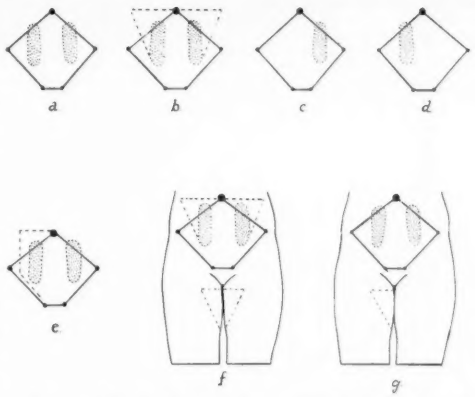


Fig. 6. Combinations of skin hyperesthesia with maximal area as a spino-umbilical-Ligat band.

*d. Skin hyperesthesia in non-inflammatory conditions of the female pelvic organs.* Twelve patients with ectopic tubal gestation were examined for skin hyperesthesia. *In 11 of the cases with external rupture resulting in the liberation of blood into the peritoneal cavity, not one showed any areas of skin hyperesthesia.* In one patient where rupture occurred into the broad ligament, with the production of a pelvic hematoma, moderate skin hyperesthesia was elicited. The presence of skin hyperesthesia in this case may be explained by the escape of blood within the layers of the broad ligament with resulting pressure or stretching of afferent nerve fibers within the broad ligament.

Here we should have a valuable aid in the differential diagnosis between ectopic tubal gestation and acute salpingitis. *The presence of skin hyperesthesia favors the diagnosis of salpingitis rather than ectopic pregnancy.* Unfortunately, however, the absence of skin hyperesthesia has no negative value, since acute salpingitis may also fail to produce skin hyperesthesia. On several instances when a diagnosis of ectopic pregnancy was made and

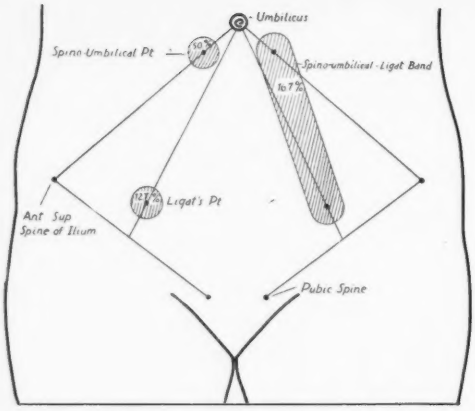


Fig. 7. Graphic representations of various points of maximal skin hyperesthesia found in acute salpingitis. Note the order of frequency of the maximal sites. In 16.7 per cent the area of maximal skin hyperesthesia was present as a band connecting the spino-umbilical point and Ligat's point.

there was a positive skin hyperesthesia the patients were operated upon and acutely inflamed tubes were found at operation. In no patient showing positive skin hyperesthesia was an ectopic pregnancy demonstrated at operation.

Why skin hyperesthesia fails to appear in cases of tubal gestation is not easy to understand. Two possibilities come to mind: (1) An ectopic pregnancy produces a localized swelling 3 to 4 millimeters in length localized in one small portion of the tube. This results in stimulation of only a few of the afferent nerve endings which may be insufficient to produce reflex reaction. On the other hand the inflammatory reaction in acute salpingitis is widespread involving the entire tube. (2) Implantation of the ovum within the mucosa with subsequent development and destructive tendencies of the chorionic tissue results in early destruction of the mucosa. Thus with the destruction of the mucosa the reflex arc is destroyed. Ligat (1919) considered the origin of the viscerosensory reflex as lying in the mucosa.

Additional cases of ectopic pregnancy are being studied at the present time to prove more conclusively the persistent negative hyperesthesia findings. The results of this study will be reported in detail in a subsequent paper.

Four cases of ovarian cysts, 1 case of endometriosis, 3 cases of intra-uterine gestation, 3 incomplete abortions, and 1 carcinoma of the ovary, failed to show any hyperalgesic areas. Eight cases of uncomplicated uterine fibromyomas likewise showed no skin hyperesthesia. However, when an associated salpingitis was found, skin hyperesthesia occurred. Thus of 3 cases of fibroids complicated by salpingitis, 2 showed exquisite skin hyperesthesia over areas typical for salpingitis.

## IMPRESSIONS

Skin hyperesthesia when present will be found if proper care is exercised. An adequate stimulus must be applied properly and sufficient time and care should be taken to determine the exact location of maximal skin hyperesthesia. It is at times difficult to choose between the spino-umbilical point and Ligat's point as the maximal area of skin hyperesthesia. At one time the one point will be found maximal, but returning a few minutes later or next day the other point will be found to be maximal. On a number of occasions, also, the maximal area of skin hyperesthesia can be determined only as a band diffusing in a downward direction from the spino-umbilical point.

The following incidences may be cited which subtract from the actual value of skin hyperesthesia as a sign. Hyperesthesia was demonstrated in several patients who were thought to have no disease of the adnexa. In 1 other case a diagnosis of ectopic pregnancy was made, but operation failed to show any demonstrable pathological condition of the tubes or elsewhere to account for patient's symptoms. This patient showed definite skin hyperesthesia. On the other hand several patients were observed with the pre-operative diagnoses of ectopic pregnancy and skin hyperesthesia was noted. At operation subacute or chronic salpingitis was disclosed, a finding which explained the presence of hyperalgesia.

In summarizing the impressions gained during this study, skin hyperesthesia, as related to pelvic inflammatory conditions,

may be said to have the following characteristics:

1. Skin hyperesthesia may be entirely absent in the most acute case of salpingitis with elevation of erythrocyte sedimentation rate, leucocytosis, pelvic peritonitis, and severe pain patient may persistently fail to develop hyperesthesia. Thus *the presence of skin sensitiveness cannot be used in gauging the severity of the infection. Also the absence of skin hyperesthesia has absolutely no negative value.* However, it may be stated that all patients having the initial attack of acute salpingitis consistently showed skin hyperesthesia with the maximal areas at either of the previously described zones.

2. Skin hyperesthesia may be of fleeting character. It may be present on admission and gone in a few hours or by the next day to return at some later time or never to return. It may be absent on admission but on examination a few days later skin sensitivity may be found. It is difficult to explain this characteristic of skin hyperesthesia. It seems to bear no relation to increase or decrease in the severity of the infection. Many of the patients show this fleeting type of skin hyperesthesia.

3. The persistent type of skin hyperesthesia which is present on admission and remains throughout the acute phase of the disease is also encountered. As the patient is examined daily, hyperesthesia will be found. Many times the maximal area of sensitiveness shifts between the spino-umbilical point, Ligat's point or a band connecting these two points. In this type as the patient improves, the hyperalgesia will tend to disappear, only to recur again with an exacerbation of the disease. The total duration of skin hyperesthesia in these patients varied between several days to 26 days.

4. The maximal area of skin hyperesthesia bears no relation to the maximal area of deep tenderness except in some cases. Therefore, one must not predict the area of maximal skin hyperalgesia according to the location of maximal deep tenderness.

5. The total area of skin hyperesthesia is variable, rarely very severe, and determined only with the exercise of diligence.

6. *A maximal area of skin sensitiveness can always be determined.* The location of this point offers sufficient aid in the diagnosis, since in acute appendicitis maximal skin hyperesthesia occurs at McBurney's point, whereas in ureteral colic it will be found in the inner portion of the thigh within the urogenital trigone.

## CONCLUSIONS

1. Fifty-three cases of acute salpingitis were examined frequently and 77.3 per cent showed the presence of skin hyperesthesia.

2. Of 10 cases of mild subacute or chronic salpingitis 60 per cent showed positive skin hyperesthesia.

3. All patients with tubo-ovarian abscess persistently failed to develop skin tenderness.

4. The maximal area of skin hyperesthesia in acute salpingitis can always be determined. This may occur at the spino-umbilical point (50 per cent) or at Ligat's point (12.7 per cent). Frequently (16.7 per cent) skin tenderness is found to diffuse downward from the spino-umbilical point in the form of a band.

5. Skin hyperesthesia occurring over the above maximal areas is characteristic of acute salpingitis but must not be relied upon solely in making the diagnosis.

6. The absence of skin hyperesthesia in acute salpingitis has no negative value.

7. Of 12 cases of ectopic tubal gestation 11 failed to show the presence of any skin hyperesthesia. The presence of skin hyperesthesia favors the diagnosis of salpingitis. In only one case in which a broad ligament hematoma was formed could any skin hyperalgesia be elicited.

8. The presence or absence of skin hyperesthesia cannot be used to determine the severity of the infection.

9. Skin hyperesthesia must be evaluated intelligently. It may be quite fleeting in character or it may be persistently absent in the face of the most severe infection of the tubes.

10. The total area of skin hyperesthesia is variable and rarely very severe.

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# ENTERECTOMY IN THE SURGICAL TREATMENT OF HEPATIC CIRRHOSIS OR PORTAL OBSTRUCTION WITH ASCITES

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IN THE medical treatment of cirrhosis of the liver with ascites, a high carbohydrate diet has been shown in certain cases to reduce the rate of ascitic accumulation (1). Various drugs have been used, such as salyrgan and merbaphen (novasural), saline and hydragogue cathartics, digitalis and iodides but as E. J. Strode says, in his recent excellent review, "the medical treatment of cirrhosis of the liver is most discouraging."

As a palliative treatment paracentesis has been used in the hope of extending the lives of cirrhosis patients. Reports of spontaneous recovery following one or more tappings are noteworthily rare, though Walter Hughson concludes that "probably as many cures have been obtained by its employment as by any other single method." The persistent adherence to the use of paracentesis by internists is justified in that it relieves the patient of the distress and interference with cardiac and pulmonary function, which large collections of ascitic fluid entail. At the same time, as aptly summarized by Hughson, "the failure of surgical treatment to show any uniform degree of benefit has developed a more or less natural hesitancy on the part of the internists to subject their patients to operation."

Hughson says: "Consideration of the technical difficulties of performing an Eck fistula on a human being is purely incidental in relation to the inevitably fatal outcome following its successful execution." With care, about one-third of the normal dogs survive the production of an Eck fistula. Many die of septicemia. According to Fischler, two types of intoxication occur following Eck fistula in dogs. The first is due to degenerative necrotic lesions of the liver regularly causing death preceded by symptoms of manic excitement and ending in coma or convulsions. The second intoxication is that produced by meat feeding and though not necessarily fatal is characterized by blindness, ataxia, muscular twitchings, and excitement. Most authorities hold little hope for the clinical application of the Eck fistula or any of its modifications.

A variety of ingenious surgical procedures for the treatment of ascites have been developed. Some procedures are designed to cause return of the ascitic fluid to the systemic circulation by saphenous venoperitoneostomy (6), some to drain the fluid into the subcutaneous tissues of the abdominal wall by a variety of methods such as the use of collar button-like glass cylinders designed by P. Paterson which are fixed in the peritoneum and abdominal muscles, while numerous other attempts have been made to drain the fluid through different parts of the urinary system. In the 25 years that the more bizarre methods have been before the profession they have not gained in favor.

Efforts to treat ascites by the establishment of a collateral circulation have usually taken the form of some kind of omentopexy. This operation, which has come to be known as the Talma-Morison (2, 8) operation, is at present the most popular major surgical procedure in the treatment of ascitic cirrhosis. Writers vary in their evaluation of it. Hughson states: "In the present series of 26 cases regarded as correctly diagnosed from either operative or autopsy observations or both, it is impossible to conclude that surgical treatment instituted for the purpose of establishing additional collaterals is of the slightest benefit in portal cirrhosis with ascites," and in evaluating the literature on omentopexy

he concludes: "on the basis of correct diagnosis . . . the figure generally accepted as representing the expected benefit from operation, 35 per cent, would fall to approximately 10 per cent, and more careful analysis would undoubtedly reduce the estimate even further."

THEORY

On the theory that accumulation of ascitic fluid in cirrhosis is due in a large part to partial obstruction of the portal circulation in the liver by nodular regeneration of glandular tissue and gradual contraction of increased connective tissue, the hypothesis was developed by Fuller and Cook that obliteration of part of the portal bed by resection of several feet of small intestine might decrease the returning venous blood to an amount which might pass through the cirrhosed liver, thereby decreasing the pressure in the portal veins and capillaries and diminishing the transudation from the portal system into the peritoneal cavity.

Of the four important reasons underlying the theory in the development of this procedure, the first (mechanical) is the most obvious, namely that obliteration of part of the portal venous bed by enterectomy will result in a decrease in the amount of portal blood entering the liver.

The second (physiochemical) is more hypothetical though based upon Heidenhain's classic experiment in which he demonstrated that hypertonic solutions of crystaloids in an isolated segment of small intestine increased in volume at the expense of water drawn from the intestinal circulation.

In this part of the theory we propose the possibility that in the remaining small intestine following enterectomy with the same amount of food and gastric, hepatic, and pancreatic secretions the relatively higher concentration of osmotically active particles present in relation to the surface area of the intestine, should tend toward a slower absorption of water into the capillary blood of the intestinal wall and furnish on the venous portal side of these capillaries a more concentrated blood of less fluid volume. The water content of the feces should be increased. This is reasonable in view of the tendency to softer stools following massive enterectomies.

The third reason takes cognizance of the generally known physiological fact that living membranes become more permeable in the presence of oxygen lack or metabolic waste product increase. In cirrhosis of the liver, because of the slowing of the portal stream, the venosity of the portal blood should be increased. Therefore, any procedure aimed at decreasing the venosity of the portal blood should lessen the permeability of the portal capillaries and other membranes and by furnishing to the liver a less venous blood, increase the chances of regeneration of liver tissue.

Fourth, removal of several feet of small intestine changes the ratio of visceral peritoneum to parietal peritoneum. Assuming that the ascitic fluid transudes through the visceral and is absorbed by the parietal peritoneum, removal of several feet of small intestine with its peritoneum should favor absorption of any fluid formed.

Three possible procedures were considered: (1) removal of from 7 to 12 feet of small intestine; (2) removal of 7 to 12 feet of small intestine and omentopexy at the same operation; (3) intestinal resection and omentopexy at the first operation to be followed by splenectomy if ascites persisted.

REPORT OF CASE

In October, 1931, the patient, a white male of 36 years, awakened one night with chills and fever, and noticed in the mirror that his skin was ashen gray. For 2 months he was very weak, had some cough, night sweats, chills, and fever. In coughing he raised only a white frothy sputum. In addition to malaise, his appetite was poor, he experienced persistent constipation and between November, 1931, and April, 1932, he lost 40 pounds in weight. In November, 1931, he weighed 185 pounds and measured 35½ inches around the waist, by April, 1932, he weighed 145 pounds and measured 33 inches at the belt line. Between April and May, 1932, his weight increased 15 pounds and his belt was let out to 35½ inches, and by July his girth had increased to 38½ inches and his weight was further increased.

By July, 1932, his ashen color was not as noticeable, his constipation was not as bothersome because of the use of mineral oil, but he coughed more raising the same white frothy sputum. He had had no pain, no shortness of breath, and no apparent edema, but his clothing seemed noticeably tighter about his abdomen. Late in July, 1932, on slight

exertion he developed shortness of breath and observed that his ankles were swollen.

Physical examination showed a well developed male of apparently his stated age with skin of yellowish gray color. The blood pressure was 90/64 millimeters mercury and the pulse was 120 per minute, but, with bed rest and digitalization, the blood pressure soon became 106/75 and the pulse about 96.

X-ray examination of the chest showed only a slight clouding over the bases of the lungs posteriorly, and a cardiac shadow of questionable to 30 per cent enlargement. Liver function and kidney function tests were within normal range. Guinea pig inoculation with sputum and ascitic fluid was negative. Electrocardiograms showed chiefly a decreased cardiac amplitude. Urine output, on restricted fluid intake, was about 800 cubic centimeters daily, and contained neither sugar nor albumin. The blood picture was normal.

The patient's abdomen continued to enlarge and paracentesis was first performed October 15, 1932, at which time 6.0 liters of ascitic fluid were obtained. On November 4, 1932, he was tapped again and 6 liters was obtained. Sixteen days later, November 20, paracentesis yielded 7 liters, and again on December 4, 7 liters, and on December 23, 6 liters of ascitic fluid was obtained. In the next 19 months he was tapped a total of 21 times. The maximum accumulation for a single tapping was 20 liters in 90 days, but the patient did not gain in weight from the sixty-eighth to the ninetieth day.

The ascitic fluid showed no change in character during this 19 month period, being of clear amber color with a specific gravity of 1.015 to 1.017 and containing a protein coagulable by heat. There were a few small and large lymphocytes present. No bacteria were ever seen and cultures of the fluid were consistently negative. For the 5 tappings during the 62 days previous to the operation, the average ascitic fluid accumulation was 0.951 liters daily.

From the onset it was noted that after tappings the râles over the lungs posteriorly and the edema of the ankles for the greater part disappeared. After each paracentesis for 2 or 3 days the patient could be fairly active with only a slight shortness of breath. However, as the accumulation of ascitic fluid continued, the edema of the ankles returned and the patient resumed his bed or wheel chair existence.

The rapid heart and decreased urine output from the first led to repeated use of digitalis and such diuretics as salyrgan. These and high carbohydrate diets were noteworthily ineffective in altering the rate of ascites formation and for several months prior to presenting himself to us for operation his only treatment had been paracentesis and liberal use of codeine and other opiates.

*Pre-operative condition.* Upon presenting himself to Drs. Walter, Zbitnoff, and Fuller for operation, the patient's chief complaint was that of ascites. The edema of his ankles and shortness of breath increased with fluid accumulation and largely disappeared following tappings. After paracentesis the abdominal wall was loose and flabby, and no abnormal masses were to be felt. The liver could be palpated above and under the flared costal margins. His blood pressure was 106/74 millimeters mercury. The heart rate was 90 per minute. There was no enlargement of the heart to percussion. A small umbilical hernia was present.

Hemoglobin was 90 per cent; erythrocytes numbered 4,850,000; leucocytes, 9,600; coagulation time was 2 minutes. His daily urine output was about 800 cubic centimeters with a specific gravity of 1.025, acid reaction to litmus, amber in color, and contained no sugar, albumin, or cells. The ascitic fluid was a clear, straw amber color with a specific gravity of 1.015–1.017. It contained protein coagu-

TABLE I.—PARACENTESIS RECORD

| Date | Number of days' accumulation | Number of liters of ascitic fluid obtained at paracentesis | Liters per day |
|---|---|---|---|
| *Before Operation* July 18, 1934 | 21 | 19 | .909 |
| August 1 | 14 | 13 | .928 |
| August 15 | 14 | 13 | .928 |
| August 25 | 10 | 10 | 1.000 |
| August 28 | 3 | 4 | 1.333 |
| *Operation* August 29, 1934 | | | |
| *After Operation* September 18 | 22 | 6.5 | .295 |
| September 26 | 8 | 6.5 | .812 |
| October 5 | 10 | 4.5 | .450 |
| October 14 | 10 | 4.5 | .450 |
| October 25 | 11 | 8 | .727 |
| November 7 | 13 | 5.5 | .423 |
| November 21 | 15 | 8 | .533 |
| December 3 | 12 | 6.5 | .541 |
| December 12 | 9 | 5.5 | .611 |
| December 22 | 10 | 5.75 | .575 |
| January 2, 1935 | 11 | 5.5 | .500 |
| January 13 | 11 | 8 | .727 |
| January 24 | 11 | 6 | .545 |
| February 6 | 13 | 2.675 | .205 |
| February 17 | 11 | 4.5 | .409 |
| March 4 | 15 | 5.5 | .366 |
| March 14 | 10 | 5 | .500 |
| March 31 | 17 | 5 | .294 |
| April 10 | 10 | 4 | .400 |
| April 22 | 12 | 4.25 | .354 |
| May 13 | 21 | 6.5 | .309 |
| May 29 | 16 | None | |

lable by heat. His stools were well formed with one bowel movement daily. The Wassermann and Kahn tests were consistently negative.

*The operation.* Under ethylene oxygen plus ether anesthesia, a right rectus (10 centimeter) incision was made and about 3,000 cubic centimeters of ascitic fluid was aspirated. The parietal peritoneum was somewhat injected and slightly thickened. The liver was smaller than normal. Its surface was uniformly nodular, the nodules being about pea size (5 to 8 millimeters in diameter). The liver margins were rounded. It appeared dark grayish red in color. No biopsy of the liver was made. The omentum was shrunken.

Beginning 12 inches below the duodenojejunal junction, 6 feet 8 inches of small intestine was removed. The ends were joined by lateral anastomosis. The abdominal wall was routinely closed without drainage.

*Postoperative care.* The patient stood the operation surprisingly well, and the postoperative care was as simple as possible. One liter of 5 per cent intravenous glucose solution was administered and ice water in small amounts was given by mouth beginning 6 hours after operation. A soft diet was given within 24 hours. Morphine and codeine were used as needed for pain. Small oil and 1, 2, 3 enemas with return flow were used to relieve gas and keep the large bowel open. In general the patient seemed to have but little more distress than does the usual appendectomy case. There was no postoperative rise of temperature. The wound healed by first intention, the patient was allowed up on the tenth day, and walked out of the hospital on the fourteenth day.

*Postoperative course.* On the tenth postoperative day there was no detectable fluid on physical examination of his abdomen, and the ankles were free from edema for the first time in over 2 years, but by the fourteenth postoperative day the presence of abdominal ascites was discernible. The patient was tapped on the twenty-second postoperative day and 6.5 liters of ascitic fluid was obtained. For the first 61 days from the day of operation, an average of 0.491 liters per day of ascitic fluid were obtained in 5 tappings; the average for 5 tappings over a period of 62 days prior to operation was 0.951 liters per day.

In the next 59 days (5 tappings) the average daily output was 0.546 liters per day; in the next 57 days (5 tappings) 0.467 liters per day; in the next 64 days (5 tappings) an average of 0.371 liters per day; 21 days later with an average of 0.309 liters per day (2 tappings); 262 days following the operation, ascites formation ceased, and there has been no evidence of fluid in the abdomen to date.

From date of operation to present time, the patient's general physical condition has constantly improved; he has gradually gained in weight and now weighs 15 pounds more than before operation.

Nor were all the benefits from the patient's viewpoint to be measured in actual per day accumulation of fluid. For two and one-half years before the operation he spent most of his time in wheel chairs and bed, leaving his "bath robe and house slipper existence" only for 2 or 3 days immediately following tappings. From the time of the operation on, however, the patient has been active almost every day. The halved rate of ascitic accumulation for the first 6 months following operation allowed him to wear his business clothes comfortably and inconspicuously. During the 20 months of complete freedom from ascites his comfort and well-being have further improved. From his former hopeless outlook he has become mentally well rehabilitated, and his zest for living has returned.

This case has been under observation from July, 1932, until the present time, a period of over 5 years. During this time the patient received no relief from his ascites by medical treatment. There had been a gradual increase in the amount of ascitic fluid as well as a greater frequency of tapping until August 29, 1934, the date of operation.

A search of the literature has failed to reveal a previous case of enterectomy in the treatment of portal obstruction or cirrhosis of the liver.

After operation no dietary regimen was imposed, the patient being allowed to follow his appetite as to any type and amount of food and liquid desired. His urine output has averaged 1300 cubic centimeters daily. Though the patient has not been constipated, he has had no tendency to diarrhea sometimes noted following massive enterectomy.

## CONCLUSION

We have presented one case of portal cirrhosis with ascites of more than 22 months' duration treated by tapping, with no tendency toward diminution. After massive intestinal resection the rate of ascites accumulation was immediately approximately halved, and following a period of gradual decrease of ascites its formation ceased 9 months after the operation. The patient has now been free from ascites for 29 months.

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# RELAXIN IN HUMAN SERUM AS A TEST OF PREGNANCY

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IN 1934 one of us (1) collaborated in a study of relaxation of the pelvic joints in pregnant humans, based on a large series of roentgenological and clinical material. Similar studies have been reported by Heyman and Lundquist; Barnes; Brooke, Roberts and Bristow; and Thoms. The conclusions, while differing slightly in detail are all in agreement on two essential findings: (1) that relaxation of the pelvic joints is a normal physiological occurrence during pregnancy; and (2) that this relaxation is demonstrable so early in pregnancy by x-ray that any mechanical etiology is rendered extremely unlikely.

In 1929 Hisaw and his co-workers were able to show that there was a substance elaborated by the corpus luteum of guinea pigs which caused relaxation of the pelvic ligaments. This hormone Hisaw named "relaxin." They were able to demonstrate it in the blood serum of several pregnant mammalia, including rabbits, guinea pigs, dogs, cats, sows, and mares. By injecting this substance into virgin guinea pigs in estrus, or in castrated pigs brought into artificial estrus with theelin, they were able to produce marked and easily demonstrable relaxation of the symphysis. However, they showed that neither theelin alone, nor relaxin without the preliminary "sensitizing" of the animal with theelin, had any such effect. They thus described a synergistic one-two action between theelin and relaxin. The latter substance has been isolated in relatively pure form.

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This one-two relation between theelin and relaxin was shown remarkably clearly by Hisaw in the male guinea pig. The pubic bones of the male are united by cartilage rather than by ligaments as in the mature female. By injecting castrated males with theelin he was able to convert the pubic joint to the ligamentous type, which then responded to relaxin.

This effect caused by theelin with the multiplication of connective tissue elements, is probably responsible for the slight amount of periodic estrus relaxation noted in virgin guinea pigs by Brouha and Simmonet, and by Pommerenke (25). The same observation has been made in menstruating humans by Goldthwait and Osgood, and by Chamberlain. The results of deFremery, Kober, and Tausk, and more recently of Tapfer and Haslhofer in producing some relaxation by massive injections of one or another preparation of the female sex hormone are also probably on this basis. We also have observed this, but the slight degree of separation achieved can be greatly increased by an additional small dose of relaxin, and should not be construed as evidence against the existence of relaxin.

Hisaw investigated the blood of pregnant women during the last trimester of pregnancy, and failed to find the hormone. He was forced to conclude either that the mechanism was different in humans or that demonstrable amounts of relaxin were present only early in pregnancy. The early widening shown by the x-ray makes this latter possibility extremely likely. Moreover the various observations indicating the lack of function of the corpus

luteum late in pregnancy, as shown by ablation experiments both in animals and humans without resultant abortion (14, 21), would make one expect to find the hormone during the early months.

The only reported observations on human serum taken early in pregnancy are those of Pommerenke (26). He tested 93 patients by the intraperitoneal injection of 5 to 6 cubic centimeters of serum into ovariectomized guinea pigs under the influence of theelin. Of 35 cases taken during the second to fourth month, positive results were obtained in 27, or 77 per cent. As pregnancy advanced the percentage grew less and less.

It is highly improbable, actually, that relaxin should be responsible for pelvic relaxation in only three-fourths of pregnant humans, if it is the active agent. Among the factors which must be taken into account are the questions of dosage and of individual variations in output. The problem is now being studied at the Boston Lying-In Hospital. The experimental data presented here are the results of an investigation of the sera of pregnant women for the hormone relaxin.

## EXPERIMENTAL

Sixty-four young virgin female guinea pigs were employed as the test animals. Forty-four of these were ovariectomized, in order to eliminate their own supply of ovarian hormones. The remainder were kept for controls and for toxicity experiments. The animals were brought into artificial estrus by the subcutaneous injection of theelin in oil, 5 units daily, usually requiring 4 to 5 days. The state of artificial estrus was determined by vaginal smear, since this was found to be more reliable than the disappearance of the vaginal membrane described by Stockard and Papanicolou.

An extract was prepared from sow's corpora lutea, after the acid-alcohol technique described by Fevold, Hisaw and Myer (18, 19, 20). The material was injected into two pigs in artificial estrus, in 1 cubic centimeter amounts, and relaxation noted in both. Relaxation in every case was determined by palpation of the symphysis after the manner of Hisaw, particular attention being paid to the degree of mobility of the pubic rami.

Whole serum from pregnant rabbits injected similarly into guinea pigs in artificial estrus effected relaxation in each of the 4 cases tested, in amounts varying from 0.5 to 2.5 cubic centimeters. In 1 case 0.25 cubic centimeter was ineffective. In order to be able to use the equivalent of large doses of serum, fractionating experiments were carried out on pregnant rabbit serum. The pseudoglobulin, globulin, and albumen portions of pregnant rabbit serum were precipitated by ammonium sulphate, the precipitate pressed dry, and redissolved in physiological saline. It was impossible to confine the hormone to any of these fractions, and numerous positive tests for relaxation were obtained with each. When these same procedures were applied to normal human serum, the resulting product was far too toxic for any practical use.

An acid-alcohol extract of pregnant rabbit serum was made, similar to the process employed with the sow's corpora lutea. This proved to be the most potent of all preparations of rabbit serum, and when this same process of extraction was applied to normal human serum no toxic effects were observed in the guinea pigs. The injection of three extracts, each the equivalent of 17 cubic centimeters of pooled human serum from women in the first half of pregnancy, produced no relaxation.

Venous blood in 30 to 50 cubic centimeter amounts was drawn from 55 pregnant women, 2 non-pregnant women, and 1 man. Of these women, 53 were in the first half of pregnancy. All of this blood was centrifuged within a few hours of being drawn, the serum being stored in the refrigerator until used.

Fifteen cubic centimeters of male human serum was injected subcutaneously, slowly, in divided doses into a normal pig in natural estrus. The animal survived, with no relaxation. Two ovariectomized pigs, in artificial estrus with theelin, were each similarly injected subcutaneously with 15 cubic centimeters of individual samples of human pregnant serum, over a 3 hour period. Both women were 3 months' gravid. At the end of 12 hours both animals showed marked relaxation at the symphysis and were apparently well. However, at the end of 24 hours both

pigs became progressively more drowsy, began to shiver and gasp for breath, and expired within a half hour of each other. There were no gross abnormal findings at autopsy; both symphyses showed marked relaxation.

In order to decrease the quantity of material injected, the serum was concentrated by evaporation to semidryness at 40 degrees C. with a constant stream of warm air, and then taken up in 2.5 to 3 cubic centimeters of saline. A viscous suspension was obtained. The equivalent of 15 cubic centimeters of early pregnant serum was injected subcutaneously into each of two pigs, relaxation took place within 12 hours, was still detectable in 24 hours, and was gone by the end of 30 hours. Both animals survived.

Similar individual preparations from the serum of 10 additional women during the first half of pregnancy were injected under the same conditions, and in each case relaxation was noted. This relaxation varied from slight to marked degrees, being determined by palpation of the joint after the manner of Hisaw. The serum of one woman in the sixth month caused relaxation. The serum of 1 woman in the eighth month was not effective, nor were the sera of 2 non-pregnant nulliparæ. Of the latter, one was at the beginning and the other in the middle of her menstrual cycle. Neither age nor parity seemed to influence the test, since the women ranged from 16 to 36 years old and from primiparæ to quintiparæ. These results are shown in Table I.

TABLE I

| Duration of pregnancy in weeks | Number tested | Age—Parity | Relaxation |
|---|---|---|---|
| 0— 4 | 0 | | |
| 4— 8 | 4 | 26—i 23—i<br>23—ii 36—i | Present in all 4 |
| 8—12 | 6 | 23—ii 28—iv<br>24—i 32—i<br>24—i 33—iii | Present in all 6 |
| 12—16 | 2 | 28—v 33—i | Present in both |
| 16—20 | 0 | | |
| 20—24 | 1 | 16—i | Present |
| 24—28 | 0 | | |
| 28—32 | 1 | 22—i | Absent |
| 32—36 | 0 | | |
| 36—40 | 0 | | |
| Non-pregnant women | 2 | 20—0 28—0 | Absent |
| Male | 1 | 24 | Absent |
| Pooled sera in first half of pregnancy | two batches | 19—i 34—iv | Present in both |

Once the pigs have received an injection of human serum they rapidly develop a sensitivity to the protein, and a few pigs died either in anaphylactic shock or with slower allergic manifestations. This has been avoided by injecting the pigs every fifth day with ½ cubic centimeter of human serum. During the course of practically every injection the animals have shown some allergic symptoms, such as watering of the eyes, cuffing at the nose, extreme restlessness, dragging of the hind quarters, and rapid respirations; in most cases these have been controlled with repeated small doses of adrenalin. Every pig that has died has received a gross postmortem examination. The most frequent finding was a congestion of the lungs with a serosanguineous exudate. Two of the pigs showing this died within a few hours of their first dose of human protein.

## EVALUATION

From these results it would appear probable that the hormone relaxin is present in early pregnant human serum, although the present series of 15 consecutive positive findings is far too small to make such a statement positively. It would also seem likely that the hormone is not present in males and non-pregnant females, and that if it is present late in pregnancy it is in amounts undetectable by this test. Again, the series is too small to warrant definite statement, particularly with regard to the later months of pregnancy. It was not possible to make any rough correlation between the degree of relaxation and the length of pregnancy in the first 4½ months.

It was noted that occasionally a pig would undergo a slight amount of symphyseal relaxation on being brought into artificial estrus with theelin. That this was not due to retained ovarian tissue producing relaxin is attested by the fact that such tissue could not be demonstrated at autopsy.

On the basis of this theelin effect, Tapfer and Haslhofer were led to believe that relaxation during pregnancy was due to theelin

alone rather than to a new corpus luteum hormone, relaxin. As further evidence they state that serum from rabbits late in pregnancy, when the corpus luteum had regressed, was much more effective in producing relaxation in experimentally prepared guinea pigs than early pregnant rabbit serum. In this regard it is interesting that, on x-ray study of pregnancy humans, both Barnes and Thoms, find that relaxation first appears in the middle of the second trimester, and that from there on to term it is a progressive affair. However, the measurements reported by Brooke, Roberts and Bristow and by Abramson, Wilson and Roberts, show that widening develops as early in pregnancy as the eighteenth to twentieth week. These workers also confirm the conclusion of Heyman and Lundquist that there is little increase in relaxation during the last trimester or in labor, the maximum rate of increase being from fifth to seventh month. This early relaxation taking place during the phase of corpus luteum activity, with lack of increase during the last trimester when the corpus luteum has regressed, point to this organ as the source of the substance responsible for the joint and ligamentous changes. On three occasions pigs with this slight preliminary theelin relaxation were injected with pregnant rabbit or human serum and in each instance the degree of relaxation was strikingly increased. The hypothesized one-two relation between theelin and relaxin is thus emphasized.

The subjective factor in palpating these pigs has been ruled out as much as possible by having someone else feel the pigs. Not knowing which pigs had been injected, he would be given a group of animals containing some controls. In no instance was there any hesitancy about picking out the pigs that had relaxed, although at times among the controls were pigs showing the slight theelin relaxation. It is realized that could an objective measurement or demonstration of this relaxation be obtained the results would be far more convincing. However, the palpable increase in mobility, which has gone by the end of 30 hours, is thought to represent a ligamentous relaxation rather than an actual separation of joint surfaces as shown by x-ray in humans.

There are both advantages and disadvantages of the use of this procedure as a test for pregnancy. Its main advantage is that the test will produce results in a period of only 12 hours. Its disadvantages, unfortunately, make the procedure rather an impractical one: The pigs must be ovariectomized; they cannot be used until brought into artificial estrus with theelin, which requires 4 to 5 days; blood serum must be used and preferably that in the first half of pregnancy. This is made difficult by the fact that patients in the obstetrical clinic usually do not present themselves for first examination until they have approached the end of the second trimester or beginning of the third trimester. Even then it is much more difficult and more bother to obtain blood from patients than it is urine. The concentration procedure requires approximately 3 hours, and the divided injections of the prepared substance an additional 1½ hours. Occasionally the pigs have unpredictable reactions from the serum. It is best in order to obtain accurate results that a pig be used for only one test. The reason for this is the extreme toughness of the skin everywhere except over the abdomen and this region becomes considerably fibrosed after one course of theelin plus pregnant serum concentrate. As a routine test of pregnancy, therefore, this is both expensive and impractical.

## SUMMARY

1. A substance was demonstrated in the corpora lutea of sows and the serum of pregnant rabbits which was capable of producing symphyseal relaxation in guinea pigs in normal or artificial estrus.

2. This substance was first described by Hisaw and named relaxin.

3. Although slight to moderate degrees of relaxation can be produced in guinea pigs by large doses of theelin, the separation is greatly increased by a small additional dose of relaxin.

4. Pelvic relaxation in pregnant animals is therefore not solely a theelin effect. The synergistic one-two relation between theelin and relaxin is emphasized.

5. A procedure has been developed for concentrating human blood serum taken from

women in the first half of pregnancy which has acted on guinea pigs in a manner similar to that of relaxin.

6. Symphyseal relaxation in guinea pigs in artificial estrus was produced by the sera of 15 consecutive women in the first half of pregnancy. The serum of 1 woman in the eighth month of pregnancy and that of 2 non-pregnant women, and of 1 male were ineffective.

7. It is believed that pelvic relaxation during pregnancy is facilitated by, or at least in part is due to the hormone relaxin and in the human species as well as in many other mammalia.

8. As a routine test of pregnancy this procedure is deemed impractical.

We wish gratefully to acknowledge the helpful interest of Drs. Hisaw and Fevold.

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# EPIDERMOID CARCINOMA IN CYSTIC TERATOMA OF THE OVARY

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IN 1925, Gordon ably pointed out the need for a universally acceptable terminology in referring to the various cystic and solid growths arising from the ovary. The names teratoma, embryoma, dermoid cyst, teratoid, mixed cell tumor, and others are used often as synonyms in articles written in the English language. The European writings add still more variety to this list. It would seem entirely logical to adhere to Gordon's suggestion that we follow the terms used by Ewing, Frank, Frankl, and others who refer to ovarian teratomas as being of two types, the cystic or common ovarian dermoid, and the solid teratoma. Graves, on the other hand, does not use the word teratoma when referring to a dermoid cyst. We shall use the terms cystic ovarian teratoma as synonymous with dermoid cyst of the ovary, and solid teratoma as referring to the rarer and essentially malignant solid teratoma of the ovary. The solid and cystic teratomas resemble each other in that they may both contain tissues representative of entoderm, ectoderm, or mesoderm.

In discussing cystic teratoma of the ovary, we must distinguish it from other dermoid tumors which are congenital sequestration tumors found at the lines of embryonic fusion, and which arise by the development and inclusion of cells of ectodermal origin.

A cystic ovarian teratoma, or dermoid cyst of the ovary, is well described by Adami, and Boyd. This is a cyst, occupying the situation of an ovary with a lining of cubical or squamous epithelium. It is invariably provided by a nipple-like mass or process called by Rokitansky "the insular protuberance," a structure which is regarded as representative of the head. This is the essential part of the tumor and gives rise to the various solid elements which are to be found in the cystic teratoma. The tuft of long hair commonly seen arises from this small lump and one or more teeth are often seen embedded in pieces of bone which at times have an appearance suggestive of a jaw. There is invariably a certain amount of semi-oleaginous material of yellowish tinge which solidifies on cooling. It is produced by small sebaceous and sudorific glands which are present here as they are in normal epidermis in its proper anatomical location. If one constantly bears in mind that an ovarian cystic teratoma is totipotent, that is, it may contain ectoderm, entoderm, and mesoderm, then it can be understood that thyroid tissue, mammary glandular elements, portions representing a testicle, in short almost any bizarre arrangement may conceivably occur in such a tumor. Kovacs reports a case of hyperthyroidism in a patient whose symptoms promptly disappeared following the removal of an ovarian dermoid containing thyroid tissue. Pick has mentioned "hydatidiform-mole-like" structures in a case of dermoid cyst.

The origin of cystic teratoma has been the subject of much academic discussion, and it is generally conceded that neither the blastomere theory of Marchand and Bonnet (10), nor the germ-cell theory of Wilms can account for every case of this type of tumor. It may well be a combination of the two ideas and there may still be other possibilities that have been overlooked as to the histiogenesis of ovarian dermoids. Boesius has attempted to prove their origin by making heteroplastic and autoplastic transplants of amphibian embryos into different parts of the bodies of adult amphibians. The embryonic tissues developed, unprotected by membranes, obtained their blood supply from their hosts, and went on to develop into polycystic tumors resembling cystic teratomas in structure and composition. Stout feels that this work lends support to the theory that these tumors are really an expression of parthenogenesis.

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Ewing scouts the blastomere or polar-body theory remarking that it cannot account for the occurrence of as many as seven dermoids in one ovary and eleven in both organs. As a matter of fact Novak has reported ten dermoids in one ovary and eleven in the other.

It is possible for retroperitoneal teratomas as well, to develop from isolated blastomeres or germ cells of an accessory retroperitoneal ovary. Gordon cites one such cystic ovarian teratoma which included the right kidney within its capsule. Kolb in 1909 stated that no solid retroperitoneal ovarian teratomas had yet been reported. Recent literature still fails to show accounts of any such tumors.

Dermoid cysts of the ovary do not seem to show any particular predilection for one side more than the other. They are usually unilateral, but are not infrequently bilateral. Graves states that 5 to 10 per cent of all ovarian tumors are dermoid cysts. The incidence of bilaterality is given by Boyd and by Deaver as 10 per cent of all dermoid cysts of the ovary. Gordon gives the range as "from 2 to 14 per cent"; Koucky says 13 per cent; Meigs found 8.3 per cent of 60 to be bilateral, while Campbell concludes that bilateral cystic teratomas of the ovary are rare and are to be found in only 1 per cent of cases.

These tumors may occur from early infancy to old age. According to Polak they are the commonest ovarian tumors prior to puberty. Lexer reports the occurrence of a large dermoid cyst of the ovary in an infant of 7 weeks, while Rossle reports a similar one in a 10 month old baby. With such data, it is not too much of a stretch of imagination to consider that an ovarian teratoma could develop within the fetus prior to its birth, and that it probably did so in Lexer's case. Eggenberger reported one the size of a baby's head in an 8 year old child, and Puhr has recently written an account of a 9 year old girl who was operated on for an ovarian dermoid the size of a small child's head. The tumor in the latter case had undergone malignant change and showed adenocarcinoma as well as basal cell epithelioma.

An ovarian dermoid is considered large when it reaches the size of a grapefruit. Most of them range in size from that of a hen's egg to that of an orange. Galabin reports the occurrence of an astonishingly large cystic teratoma of the ovary which weighed 160 pounds.

Among the numerous complications which may arise from the presence of these dermoid cysts should be mentioned some which need not be associated with neoplastic changes within the tumor. Torsion of the mass on its pedicle, which is apt to be long, may give rise to symptoms of toxemia due to the absorption of necrotic material. Numerous adhesions may form and result in a picture suggesting acute, subacute, or chronic ileus. Tuberculous peritonitis may be so closely simulated as to be clinically indistinguishable from it.

About a year ago the author saw a young Japanese woman in consultation in whom the symptoms, history, physical findings, intermittent septic type of fever, and high white cell count together with an acutely tender fluctuating mass in the cul-de-sac of Douglas led to the diagnosis of a cul-de-sac abscess. Posterior colpotomy yielded, first, thick malodorous pus which was followed by a stream of oily fluid mingled with hairs. Three weeks later, a densely adherent typical ovarian dermoid cyst was removed at laparotomy. The dermoid may rupture into the sigmoid, rectum, or bladder. In the past, the passage of hairs in the urine has led to the diagnosis. Mayer's case was diagnosed on the finding of hairs in the stools.

Inasmuch as tissues originating from ectoderm, entoderm, or mesoderm may occur in ovarian dermoids, various types of malignancy have been found. Dougal has reported primary chorioepithelioma originating within the tumor. Amann and Lorrain have found pigmented sarcomas. Yamagiwa has reported the occurrence in the cystic ovarian teratoma of an adenocarcinoma such as is found in the breast. Litten has found a round cell sarcoma in the wall of an ovarian dermoid, with metastases to the liver. The occurrence of malignancy in dermoids of the ovary runs parallel with the incidence of malignant tumors elsewhere. Koucky believes that 1 per cent of cystic ovarian teratomas undergo malignant alterations. Goodall and Deaver say 3 per cent, while Gordon places the figure

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TABLE I.—SUMMARY OF RECENT CASES OF EPIDERMOID CANCER RECURRING IN CYSTIC OVARIAN TERATOMAS

| Case No. | Author year | Age yrs. | Pregnancies | Duration | | Pre-operative diagnosis | Treatment | Outcome |
|---|---|---|---|---|---|---|---|---|
| | | | | Tumor | Pain | | | |
| 44 | Millot and Hinard 1934 | 46 | 4 | ? | 4 mos. | (1) Incomplete abortion (2) Myoma uteri | Left salpingo-oophorectomy | Not stated |
| 45 | Caillot and Boulez 1934 | 48 | 0 | ? | 2 mos. | Uterine tumor | Bilateral salpingo-oophorectomy | Re-operation in 2 wks. Enterostomy for acute ileus. Death in 6 weeks |
| 46 | Caillot and Boulez 1934 | 19 | 0 | 4 mos. | 2 mos. | Uterine sarcoma | Left salpingo-oophorectomy. Subtotal hysterectomy | Fatal termination expected soon |
| 47 | Denis 1935 | 34 | ? | ? | 2 mos. | Intestinal obstruction | 2 stage operation (1) closure of cecal perforation and colostomy; (2) left salpingo-oophorectomy and intestinal resection | Not stated. Considered hopeless as pelvis filled with recurrent mass |
| 48 | Denis 1935 | 68 | 3 | c. 13 yrs. | 13 yrs. moderate 6 mos. severe | Ovarian tumor | Left salpingo-oophorectomy. Resection of intestine | Immediate recovery. Prognosis bad. Follow-up not stated |
| 49 | Bowles 1936 | 68 | 2 | 20 yrs. | None | Left ovarian cyst (?) Fibroid uterus (?) | Bilateral salpingo-oophorectomy | Died 4 months after operation |

at 3 to 5 per cent. Graves remarks that there is only a slight tendency of the ovarian dermoid to become malignant, as compared with the solid teratoma. Other authors including Crossen (20), Anspach, and Cameron remark that these tumors are potentially malignant, and some of them undergo malignant changes.

It is well to be cautious before making a flat statement that a given malignant tumor has originated within the ovary. Masson and Ochsenhirt have pointed out that there are three possibilities: (1) the malignancy may develop within the dermoid, (2) malignancy may form in a portion of an ovary or a malignant ovarian cyst associated with a dermoid in another part of the same ovary, and (3) malignant invasion of the dermoid may occur from an adjacent organ.

We have considerable evidence that malignant tumors arising in cystic ovarian teratomas can and do metastasize as do malignant tumors occurring elsewhere. The metastases may be teratoid, carcinoma, or a simple tissue as glia only. Clark states that distant metastases as to the axillary glands are uncommon. Kleinknecht and colleagues report the case of a cystic ovarian teratoma in a young woman in whom an acute abdominal crisis was precipitated by extensive hepatic and retroperitoneal tumor masses which were apparently secondary to the ovarian tumor. Unfortunately, histological confirmation is lacking. Puhr's patient, a 9 year old girl with basal cell epithelioma and adenocarcinoma occurring in an ovarian dermoid, died shortly after laparotomy with the diagnosis of brain tumor. Autopsy showed extensive metastases to the spine, cranium, and other bones. It was believed that they originated in the ovarian dermoid but again histological evidence is lacking. Krukenberg, Ascanio-Suarez, and Counseller have reported cases of ovarian dermoids containing squamous cell cancer which had metastasized to the liver.

Most cases of malignancy occurring in ovarian dermoids are epidermoid carcinomas of the squamous type. In 408 such cysts at the Mayo Clinic between 1912 and 1931, 7 or 1.7 per cent, were proved grossly and microscopically to be associated with primary epithelioma of the epithelial elements of the cysts. Frank states that the carcinoma takes the form of ripe squamous epithelioma with pearl formation. Even though the pearly bodies are usually present, it is not invariably so as can be seen by examining the reports of Masson and Ochsenhirt, who have shown some of the epidermoid carcinomas to contain

more youthful squamous cells without pearl formation. Gordon gives the percentage of epidermoid carcinoma in malignant tumors originating in cystic teratomas of the ovary as from 3 to 5. Out of 60 dermoids of the ovary, Weiner found 3 specimens, 5 per cent, to show epidermoid carcinoma. Surely a careful examination of all ovarian dermoids removed at operation would show many more instances of malignancy than are being reported.

Meigs issues a warning note pointing out that simple dermoid cysts of the ovary may show epithelium which looks like carcinoma but is not. He considers that the presence of malignant areas in a dermoid does not necessarily mean a bad prognosis as much depends on whether the growth has perforated the capsule and invaded the peritoneum.

The age incidence of epidermoid carcinoma in cystic ovarian teratoma parallels that of this type of cancer in other portions of the body. It seems reasonable to expect that the younger the patient, the more rapidly fatal the outcome. The three youngest authentic cases of squamous cell cancer in ovarian dermoids to be reported in the literature are those of Caillot, Reppun, and Bierman. The patients' ages were 19, 20, and 21 years, respectively. Bierman's patient was not operated on but died on the third day after examination, and necropsy revealed extensive invasion of the bladder, rectum, uterus, and left ovary (the primary tumor was in the right ovary). Squamous carcinoma cells with epithelial pearls were found in profusion. Reppun's patient died 3 days after operation. The rectum and sigmoid were extensively involved. Caillot's patient was still living a few months after operation but the prognosis was regarded as hopeless as an absolute extirpation was impossible due to infiltration of neighboring viscera.

In the series of cases of epidermoid cancer in cystic ovarian teratomas reported by Masson and Ochsenhirt, the results were recorded in 18. Death followed from recurrence in from a few days to 2 years after operation in the majority. Lapouge's patient lived 7 years and died of abdominal recurrence. Ludwig's patient was well at the end of 2 years but further report is lacking. Masson and Ochsenhirt have reported 1 of their cases to be well at the end of 5 years. Counseller's patient was reported to be in good health 15 years after operation.

In addition to the squamous cell types of cancer found in dermoids of the ovary, typical basal cell cancers have been reported by Spaulding and Puhr. Puhr's case was also associated with adenocarcinoma.

To date there has been no satisfactory method of early diagnosis of malignancy occurring in a dermoid. We should strive, however, to attain greater accuracy in the diagnosis of pelvic tumors. Numerous articles have appeared attesting to the value of roentgenographs in the diagnosis of ovarian dermoids. Among these should be mentioned papers by Aimé, Eideken, and Spillman. In interpreting the films it should be borne in mind that a single tooth lying in the line of the ureter may be confounded with a ureteral calculus. Spillman and Knox, have remarked on such a possibility, and Sonntag cites a case in which a tooth was mistaken for a stone in the ureter. Alexander refers to a similar case in which a second picture taken from the side threw out the tentative diagnosis of ureteral stone. In our case, the report of which follows, we failed to have made roentgenograms of the pelvis, and hence the dermoid cysts were not diagnosed until operation.

In addition to the dangers of metastasis in these tumors, we have to deal with those associated with the infiltration of adjacent organs by the tumor mass. Acute intestinal blocking may precipitate an emergency as did Denis' case, a patient aged 34 years. Forster's patient showed extensive invasion of the ileum with pearl formation in the cyst as well as in the intestinal wall. Fairbairns' patient had extensive bladder involvement, and Millot and Denis, have reported severe uterine bleeding in their patients.

The ideal treatment of all ovarian dermoids, whether they appear benign or malignant, is still total and clean ablation whenever possible and as soon as possible as urged by Senn in 1895. One should never temporize longer than is absolutely necessary if the patient is

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in any condition to permit operation. When complete removal is impossible, one must attempt to relieve intestinal obstruction by whatever procedure seems to promise the most relief in that particular case. Colostomy may sometimes be necessary. In extensive bladder invasion, it may be imperative to give temporary relief by transplanting the ureters into the lower large bowel, or if that is impossible, to the abdominal walls to permit external drainage of the urine. Hysterectomy is often necessary.

Many of the patients who have had dermoid cysts of the ovaries have had several normal pregnancies. Our patient aged 68 years when she consulted us for the first time, had had two uneventful pregnancies and deliveries in spite of bilateral cystic ovarian teratomas. Perusal of the literature yields the record of only one other case resembling ours in that both ovaries had been replaced by cystic teratomas only one of which had become the site of squamous cell carcinoma. This was reported by Krukenberg in a woman 43 years of age. No references have been found of bilateral ovarian dermoids both of which have become malignant.

Counseller, in 1934, reported the fortieth to the forty-third cases of cystic ovarian dermoid to undergo intrinsic changes due to squamous cell carcinoma. Since then 5 other authentic cases have been added. These have been reported by Millot, Caillot (2 cases), Denis and Duflant. Ours therefore, makes the forty-ninth. A résumé follows:

Mrs. I. I., Japanese, aged 68 years, was admitted to Queen's Hospital September 13, 1936, complaining of constipation, low sacral backache, and a large lump in the lower left abdomen.

About 20 years ago, she first noticed a lump in the lower left abdomen. It was about the size of a baseball at that time. It has slowly enlarged until last year since when the enlargement has been more rapid. There has never been any pain in the region of the lump, nor anything but a feeling of heaviness. The appetite has always been good, but during the past year constipation and low sacral backache have developed insidiously and have slowly increased. The sluggishness of her bowels is the most distressing symptom.

She has never been ill nor has she been to a doctor until now. The menses have been regular until menopause, 16 years ago. She has never suffered from dysmenorrhea. The family history is irrelevant. She smokes cigarettes heavily, but uses no alcohol.

Physical examination revealed a shrunken Japanese woman of about 70 years. She did not appear critically ill or in any way suffering. Her temperature was 98.2; pulse, 76; respiration, 18. The only positive physical findings were: (1) bilateral circulus senilis; (2) sluggishness of direct and consensual pupillary reflexes; (3) moderate deafness both ears; (4) a few teeth missing; (5) slight gingivitis; (6) heaving pulsation both sides of neck; (7) a few firm enlarged lymph nodes both sides of neck, freely movable; (8) lungs moderately hyperresonant throughout; (9) abdomen enlarged to size of 5 month's pregnancy, most of the mass to the left of the midline, where a large hard rounded tumor could be felt. It seemed to be attached firmly on its under surface to the subjacent structures. It felt smooth and rounded but no fluctuation could be elicited. It was not tender on firm pressure but the patient winced when the tumor was pushed very far to either side. The anterior part could be moved but the base seemed fixed. Other abdominal findings were negative. (10) The uterine body was not distinct and seemed to merge with the tumor mass. There was a firm rounded fullness of right adnexal region but no tenderness. The entire left iliac fossa was filled with the large tumor. No tenderness was noted in the left fornix. (11) The extremities were poorly muscled.

The blood Wassermann and Kahn tests were negative. All other tests were within normal limits for a woman of 68.

The pre-operative diagnosis was: left ovarian cyst or large myomatous uterus, possible left renal tumor.

Operation was done under neocain intraspinal anesthesia. No additional anesthetic was necessary. On incision of the peritoneum, a small amount of free straw-colored fluid was seen and was removed by vacuum suction. An elliptical tumor the size of a full term fetal head was now encountered, the presenting surface of which was smooth and a beautiful lemon yellow in color suggesting a layer of thick cake frosting. This tumor lay in the hollow of the left ileum and was densely adherent to the fascia on the under side of the tumor. It displaced the descending colon and the sigmoid nearly to the midline of the abdomen and was densely adherent to their lateral surfaces. Although there were obvious patches of thickening and induration in the tumor, these were all smooth and no irregular papillomatous or fungating areas were found on its outer surface. The tumor felt like a cyst under marked tension. The lower pole connected with a wide band of tough tissue which formed a pedicle representing the left adnexal attachments to the uterus. The tumor mass was freed first on its under surface working mesial from its lateral boundaries. Having freed it from its bed we were now able to flip the tumor over in a counterclockwise direction to the midline of the abdomen. The adnexal pedicle was severed and ligated, and the mesial side of the tumor, adherent

to the sigmoid and descending colon was freed by careful blunt dissection. This allowed the tumor to be removed. A raw bed remained. It did not bleed, and was left alone as no tissue was available with which to cover it. The extirpated left ovarian tumor measured 19 by 16 by 14 centimeters. Later, it was found that its walls were 1 millimeter in thickness at the thinnest portions and 2 centimeters at the thickest. It was also found to contain several large loculations filled with semi-solid lard-like material and many long black hairs. Rokitansky's insular protuberance was clearly demonstrable in the largest loculation. It was roentgenographed after removal and two small plaques of bone were clearly visible.

Another adherent cystic tumor arising from the right ovary was next removed from the right iliac fossa. Despite precautions, this ruptured during its extirpation. It was found to contain oily fluid, hairs, teeth, and bone. The entire sac was removed and the raw surface partly peritonealized. The abdomen was closed without drainage. Crossen, Ashton, Bovée, Doyen and others warn against the dangers of spilling the fluid from these dermoid cysts. It is said to be very irritating and may produce a serious peritonitis. The literature is strangely silent as to exactly why this fluid should be so irritating in the absence of infectious organisms. Our cultures taken from this spilled fluid were negative. Senn has remarked that aside from the irritation alone and the resulting adhesions, the spilled contents may produce large numbers of secondary growths the most of which are the size of a cherry. These are each furnished with a tuft of lanugo-like hair, and occur in clusters or imbedded in adhesions.

The first 4 days were stormy but the patient left the hospital on the sixteenth postoperative day in good general condition with a firm scar.

Three months after operation, she was up and about having no complaints except occasional low sacral backache which was relieved by small doses of codeine and aspirin. Bowel action had improved and she required only occasional mild laxatives.

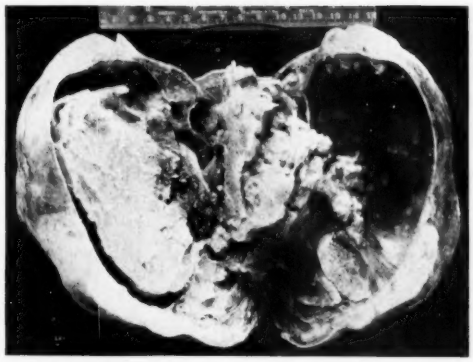

Fig. 1. Gross appearance of carcinomatous dermoid cyst of left ovary.

Since the capsule of the large left ovarian cystic teratoma was definitely broken through on its under surface making the total ablation of the subjacent tissues impossible, the patient was not expected to survive for long. She died in the country 4 months and 4 days after the operation. Unfortunately, we were informed too late to obtain an autopsy. Her sons stated that she had had no further trouble from constipation though her backache persisted until death, which was a gradual one. The patient weakened from day to day for the last 2 weeks of her life.

Histological sections were prepared from pieces of tissue excised from the notched area appearing just above the ends of the short ruler in the photograph, and also from the under surface which does not show. The picture shows the undulations pro-

Fig. 2. Low power magnification of section near wall.

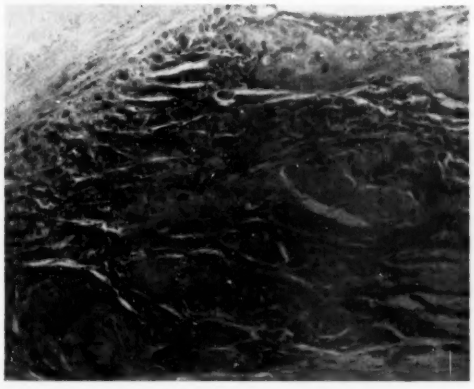

Fig. 3. High power magnification of section near wall. Note mitotic figures.

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duced by carcinomatous patches in the tumor wall. Hair and caked fatty material can also be clearly seen.

## SUMMARY AND CONCLUSIONS

It is suggested that we adhere to the terminology of Ewing, Frank, and others in discussing ovarian teratomas, dividing the group into solid and cystic teratomas. The latter is used synonymously with the term dermoid cyst of the ovary.

Either type of teratoma may contain tissues representing ectoderm, entoderm, or mesoderm. Hence many bizarre arrangements occur.

The essential part of an ovarian dermoid is the "insular protuberance" whence the solid elements of the tumor arise.

Opinion is still divided between the blastomere and the germ-cell theory of origin of cystic teratoma of the ovary.

Five to 10 per cent of ovarian tumors are said to be dermoid cysts. Various authors state that bilateral ovarian dermoids occur in from 1 to 14 per cent of cases. Cystic teratoma of the ovary has been reported as occurring between early infancy and old age. It is the commonest ovarian tumor that is found prior to puberty.

Numerous complications may result from ovarian dermoids among which are intestinal obstruction of varying degrees, toxic symptoms due to torsion of the tumor on its pedicle, infection and peritonitis, uterine hemorrhage, and malignant degeneration of the tumor.

The incidence of malignancy in cystic teratomas of the ovary runs parallel with malignancy elsewhere in the body. Figures of various authors vary, thus anywhere from 1 to 5 per cent of all ovarian dermoids have been shown to be malignant. They are all potentially malignant.

Caution must be used in making a definite statement that a given malignant tumor has originated within the ovary. It may have arisen in another part of the ovary and extended into the dermoid cyst or the invasion may have occurred from primary malignancy in an adjacent organ.

Most malignant tumors occurring in ovarian dermoids may metastasize. The liver is frequently involved.

Of all the possible types of malignancy that may occur in an ovarian dermoid, squamous cell carcinoma is the commonest (3 to 5 per cent). The prognosis is gloomy in most cases if the capsule has been broken through and peritoneal invasion has occurred.

Roentgenographs of all ovarian tumors would add to the accuracy of the pre-operative diagnosis.

The only satisfactory treatment of ovarian dermoids is early and complete removal of the tumors. Any patient who is a good risk should receive operation.

Since Counseller's report in 1931, 5 additional cases of epidermoid carcinoma originating in ovarian dermoid cysts have been reported, bringing the total of authentic cases up to 48. The author wishes to add 1 more case to the list, bringing the total to 49. Death occurred in 4 months after operation, in this last case.

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# CLINICAL SURGERY

*FROM THE DEPARTMENT OF SURGERY, UNIVERSITY OF ROCHESTER*

## THE PROBLEMS OF UNILATERAL HARELIP REPAIR

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THERE are few conditions in which the possibilities are so little realized as in the repair of harelips. The average repair of a harelip leaves a child so marked that it is perfectly evident to anyone that the individual is not as you and I. If we were to analyze just why we know the person has something wrong with his face, we would undoubtedly find it difficult to say where the fault is. Nevertheless, if you reflect that all of us can recognize countless individuals entirely by their facial make-up, it becomes evident how very sensitive the human eye is to only the slightest differences in facial ensemble.

The ideal, then, in repairing a harelip is to produce a face which will, to the casual observer, bear no stigmas of the original fault. This I may say is a most difficult task and a result not often obtained, but by dint of hard work and experience, a thing which can be fairly closely approximated. To the highly critical eye, none of them will be perfect, but some will be acceptable.

I think that the secret of such an acceptable result is that the face be normally contoured. By this I mean that the features of the mid-face be in correct proportion and position, and above all, symmetrical. For there is nothing more obvious than an abnormality due to asymmetry. Scars can be forgotten if the lip and nose are symmetrically assembled, but if they are not, our eye immediately dissociates the component parts, and the lip and nose unfold into the original condition. If one can stand a few feet away, so that the scar is obliterated, and not be conscious that something is wrong with the nose or lip, then the result is probably as good as can be attained by any means of correction which is at present at our command.

*The deformity.* I like to consider a harelip as presenting three separate deformities. First, the separation of the maxilla, which may vary greatly. There may be in slight notching of the lip, a normal contoured maxilla with the only fault being absence of the lateral incisor tooth in line with the

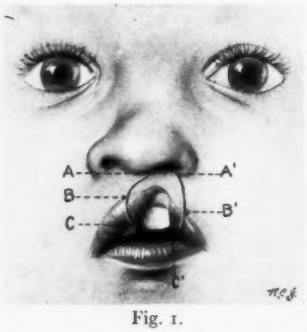


Fig. 1.

Fig. 2.

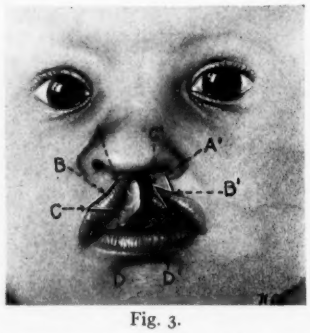


Fig. 3.

Fig. 1. Rose type of operation. The incisions $AC$ and $A'C'$ are equal in length and to the desired vertical height of the lip. $BC$ equals $B'C'$.

Fig. 2. Thompson type of operation. $YX$ is the desired vertical height of the new lip. $ZX$ is the measured width of the vermilion. $AB$ equals $A'B'$ equals $YZ$. $BC$ equals $B'C'$ equals $ZX$.

Fig. 3. Mirault type of operation. $A$ is placed on mucocutaneous line at point where the line through the base of obliquely placed columella meets vermilion. $AC$ is a little greater than the desired vertical height of lip because this line will pass obliquely from nostril to mid-point of lip when repair is finished. $B$ is half way between $A$ and $C$. $A'B'C'$ equals $ABC$, and is planned so that point meets point. $CD$ equals $C'D'$ and when completed, passes obliquely across vermilion in reverse direction to $ABC$. This staggered effect helps to disguise the scar. There is less material sacrificed by this plan than any other.

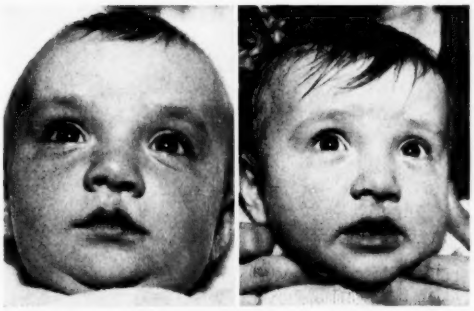

Fig. 4. This child was 4 months old when operated on. Photograph at left was taken the day before operation and shows that there is merely a tiny cleft in the vermilion, hardly even a scar extending up into the lip proper. The nose is normal. At right, the child 3 months later. The lip is good. This was done by just making a V freshening of the cleft, and suturing it with a little fullness of the lower edge of the vermilion. This child is shown to illustrate the fact that even as simple a notch as this can be made more pronounced by an operation which does not leave a fullness at the suture line. I have now come to believe that it is better to leave an excess and later excise it horizontally to get a smooth lip, rather than run the chance of the notch recurring as the scar contracts. In this child, the fullness left just took care of the contracture.

Fig. 5. Left, the pre-operative photograph of a 3 months' old baby born with an incomplete harelip. There is also a partial cleft of the maxilla. The palate is normal. This illustrates again that the nasal deformity is practically always present even though the cleft of the lip extends only about half way into it as shown here. For some reason, I did not get this nasal deformity corrected at first operation. When the child was a year old, a diamond-shaped piece was removed from the floor of the nostril and lip, so that the columella and ala were brought into approximately normal position as shown in right photograph. The mother says that now she has practically forgotten that her child had ever had a harelip, whereas before she was constantly being asked by her friends why the baby's nose was deformed.

cleft; there may be only slight indentation of the inferior edge in line with the separated lip, and so on until we reach the most marked deformity with wide separation of the maxilla and forward projection of the premaxilla on the uncleft side.

Fig. 6. A 10 months' old child with an incomplete cleft of lip. Notice that although the cleft extends only about half way into the lip, the nostril above it is broad and flat and the columella is obliquely inclined to the right. This is practically always so, and must be corrected. The maxilla is only partially cleft, but the left maxillary central incisor, due to there being no lip over it, has grown in a rotated and angulated position. In the repair, this tooth was extracted and the nostril narrowed. At right, photograph 1 year later shows an average result. Note that the nose is well placed but that the two nares are not of the same configuration. This is because the lower end of the left ala was not rotated inward, but was brought directly across.

Second, there is the cleft in the lip. At first sight, it would seem that these were all alike, varying only in whether the split extends completely into the nostril or only part way through the lip. This is true for the most part, but in a good many instances there is considerably less available vertical length of lip on the cleft side

Fig. 7. Left photograph shows a 3 weeks' old infant with the characteristic deformity of an incomplete cleft of the lip, but a complete cleft of the maxilla. At right, 6 months later, is shown the result obtained by the Mirault operation. Notice the normal nose with no flattening, the ala curls inward at the bottom, and the columella in midline. This is one of the cases recently done, and in which a crescentic excision of skin was done on the superior aspect of the ala to correct overhang as advocated by Blair. When the right picture was taken, the arch was already normally contoured.

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Fig. 8. This case is shown to bring out two points. First, that even though repair is done late, the cleft in the jaw will usually be closed by the growth process when the molding pressure of a lip is over it. Second, that unless the soft parts are draped in normal fashion over the underlying bony and cartilaginous framework, there will be no tendency of the nasal deformity to correct itself. Left, Condition when the girl was presented at the age of 2 years. The nasal obliquity is marked, and the jaw cleft is wide open. Right, 6 years later. The alveolar ridge, although it does not show in the photograph, is reconstituted and there are teeth in it which occlude well. This has occurred following original repair of the lip, at which time nothing at all was done to the bony cleft. Moreover, a lateral view shows normal position of the upper face with relationship to the chin. The nose, however, I did not get in midline of the face, and it is still inclined a little to the left, and the right nostril is not symmetrical with the left. This deformity of the nose could and I think should be corrected, but the family are satisfied. When the girl gets of age, she probably will want something done. It is my experience that parents oftentimes prevent deformities being corrected which the patient, when he can make his own decisions, is anxious to have eradicated.

Fig. 9. This infant was 7 weeks old when first seen. His doctor wrote to me when he was 6 weeks old, asking how soon the lip should be repaired as he was under the impression that one waited until the child was 2 or 3 months of age before doing anything. Left photograph was taken 2 days before operation, the child being 9 weeks old. One notices that this is a cleft of lip and maxilla without cleft of palate. There is rather marked projection of the premaxilla. The nose is fairly well in the midline, the obliquity being mainly in the columella. The left ala is of the flat type with a rolling out of the outer portion, so that one is actually looking at nasal lining. I think that this fact is often not appreciated, so that in the repair, this lining is brought over to the columella rather than being rolled inward after complete mobilization, and the true base of the ala brought inward in normal position. In repairing this, the maxilla was molded inward by digital pressure. Both cheeks and columella were loosened subperiosteally from maxilla, more so on left, through intra-oral incisions. The left ala was cleanly cut from its lateral attachment up to the nasal process. I tried in this child making an incision along the left base of the nasal septum, freeing the mucosa and suturing the cut edge of lining of left ala to this. The lip was done by a modified Mirault operation but as one can see in right photograph, at age of 7 months, this made the left nostril too small, although well-shaped and in correct position. The obliquity of the nose is corrected. The lip is not good, the vermilion being poorly matched and not even. The arch at this time was perfectly normal in contour. The lip should and will be readjusted. If one measures from ala to lip, there is a shorter distance on the left. This is not very noticeable, but is a fault of the Mirault operation which I have found hard to overcome.

than on the uncleft. This should be carefully looked for and be considered in the repair, for a slight discrepancy in vertical height of the lip on the two sides, i.e., distance from ala to mouth line, is quite noticeable in the finished product.

Third, the deformity of the nose, is, I feel, the most important of the three, and varies most widely. There is in all unilateral harelips, excepting those which are barely notches in the lip line, abnormality in contour of the nostril on the affected side as well as malposition of the nose as a whole. The nose is shifted to the side opposite the cleft. The columella lies obliquely inclined from above downward toward the sound side, so that a line through the base of the columella is not in the horizontal plane, but an oblique one. The nostril in the extreme case may be drawn out into a flat line with the lining of the nares in its lateral aspect flush with the cheek and lip surface, and in such instances, may be mistaken as a part of the lip. The lateral base of the ala may have very little form, almost blending with the cheek.

*The repair.* The successful repair of a harelip must overcome the abnormalities mentioned. The cleft in the bone can be disregarded, for there are very few jaw splits which will not close from the pressure of the repaired lip and its constant muscular play, even though the repair is done relatively late (Fig. 8). The so called Brophy operation, actually done years before Brophy's popularization of it, is unnecessary and deforming. The wiring of the jaw split destroys or deforms tooth buds, often causes later retrocession of the upper face, and is, moreover, attended by some

Fig. 10. This child is shown to illustrate the fact that the Rose type of operation gives a lip which is too long in the vertical plane. I call them "horse lips." As can be seen in left photograph, the deformity is a right, unilateral cleft of lip, jaw, and palate. There is not very much nasal obliquity. This case was done some time ago, and a preliminary wiring of the upper jaw was done at age of 2 months. When the infant was 4 months old, the lip was repaired. When 2 years of age, the palate was repaired by the Langenbeck procedure. Right, Photograph showing the appearance at 2 years. Fortunately, there is no retrocession of the maxilla. I no longer use the Brophy wiring, depending on the repaired lip to close the jaw cleft as the child grows, which it practically always does.

hazards (Fig. 15). Although I am perfectly well aware that very few men doing oral and plastic surgery any longer use forceful closure of the alveolar cleft, I do not feel that I am jousting with windmills in bringing up this point, for the rank and file of surgeons still do. I still see children

Fig. 12. The baby, as can be seen in left photograph, is one of the type that just missed having a double harelip. There is a complete cleft of lip, jaw, and palate on the right. On the left, there is a notching on the lip, and a "union" scar extending up into the nostril. There is the usual drawn-out ala on the right with obliquity of the columella. Repair was done at 7 weeks, and right photograph shows the result 2 weeks after operation. This is a Mirault repair and the nose is a good one. The lip is also good. The small notch is the incomplete cleft on the left, and will be smoothed out at the time of palate repair.

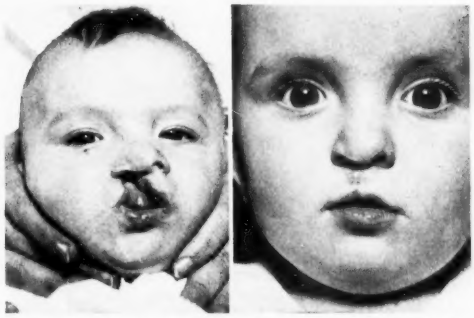

Fig. 11. This is another of the wide open clefts of lip, jaw, and palate. The deformity is of the same type, although not quite so marked as in Figure 14. The lining of the ala on the cleft side is not facing outward as much. Right photograph shows a good result from the Thompson type of operation. The ala has been rotated in correctly, but there is an overhang of the superior part of the alar cartilage. This probably could have been corrected by a crescentic excision of skin just above the overhang, as recently advocated by Blair.

brought for correction of a backward displacement of the upper lip due to closing forcibly the alveolar cleft in infancy. It is an extra, unnecessary, and harmful step in the repair of a harelip.

Strange to say, the cleft of the lip which most people would say is the conspicuous part of the

Fig. 13. The baby's parents had been advised by their family doctor to "wait awhile" before having the lip repaired, so that when I first saw the boy, he was 8 months old. The deformity as shown in left photograph is a very marked one. I closed the lip over the wide open premaxilla by a Thompson type of operation. This worked excellently for about 2 weeks, and then the ala slipped down into the bony cleft. This occasionally happens in spite of every effort by careful suturing to prevent it. I repaired the palate at 18 months, and at 2 years of age, corrected the nasal deformity which had resulted from the ala slipping at original operation. In spite of the delay in lip closure, the alveolar ridge is normal in contour. At right, 2 weeks following final operation on the lip, the recent suture line is visible. This will disappear in a few months.

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Fig. 14. Left, The familiar marked deformity of a complete unilateral cleft lip, maxilla, and palate. At first sight, this seems much harder to repair than an incomplete cleft lip, and it is. But I had rather repair one of this type than one such as shown in Figures 6 or 7, because I know that I will work harder to get an approximately normal nose and lip, and the deformity is so marked that the parents will be grateful for something a little less than perfect which, unfortunately, is practically always the case. If the preoperative photograph is analyzed, it will be found that everything for a normal lip and nose is present, but badly arranged. The columella lies obliquely to the left of the midline. The right ala is almost a flat band with the lateral lining everted. The cleft in the maxilla is so wide open that when the right nares is constructed in the right position, there will be no foundation for it to rest on. It is this last point that undoubtedly first caused Brophy and others before him to wish to reconstitute the alveolar arch before uniting the lip. This, however, I do not do because of the later deformity of the maxilla which often follows forcible wiring of the arch. It is true that occasionally the reconstructed nostril will slump down into the cleft of the arch, but this can usually be avoided by careful internal suturing of the soft parts. In case it does occur, it can be corrected by a second operation as in Figure 13.

In this case, after digital molding of the maxilla, a wide mobilization was done on both sides; on the cleft side, practically to the rim of the orbit. In these mobilizations, one often sees the infra-orbital nerve plainly, and I often sacrifice it if it seems to hold the cheek. Incisions of a modified Mirault operation were made and the repair completed. The postoperative view is 2 weeks afterward, so that the scar is still prominent. The nose is about as good as one gets. The nostril is correctly shaped, the ala curves in normally, and the floor of the nares is at the right level. The columella is exactly in the midline. The lip is not quite so good, but the distance from ala to vermilion on either side is equal, the most difficult part of this type of repair.

Fig. 15. The way a child should and should not look following repair of a unilateral harelip. Left, Infant 6 months following simple closure of lip over a wide open alveolar cleft. Notice the normal, full, pouting lip of a baby. The alveolar cleft has closed, leaving the normal baby arch. Right, A child 7 years old as I first saw her. She had been operated on five times. The maxilla is markedly retrocessed. Many of the upper teeth are absent and those that are present are malformed. The upper lip is drawn tightly across the small upper jaw. The right side of the nose is completely obstructed by a deviated septum. This is so marked that the right nasal bone is actually being shoved outward. This is all due to loss of maxilla either from forceful closure of alveolar cleft, or actual excision of bone in infancy. The five previous operations and the four which I had to do to make her somewhat presentable, could all have been avoided by a simple closure of lip in infancy in accordance with the physiology of growing infant bone. Moreover, the end-result would have been better.

deformity is the least difficult to repair acceptably. There are certain points about it which should be kept in mind, and if these are paid attention to, a fairly normal lip should be obtained. These are: The vertical height of the lip on the two sides should be equal. This height should not be too great, or an inartistically long upper lip will be the result. The vermilion edge should meet smoothly on the same plane. The "mouth line" (junction of lips when closed) should be smooth without notching or an excess "blob" at the suture line.

A considerable number of operations have been devised in the past for harelip repair. The most common of these are the Rose, Thompson, Owen, and Mirault operations. I have used all of these except the Owen operation. They all have some inherent defects in plan.

The Rose operation (Fig. 1) is the simplest of all. As shown in the diagram, it is a simple cutting away of the vermilion surfaces of the cleft along with considerable lip tissue. The points to be kept in mind in making these incisions, are that the two sides be equal in length, that the finished distances $AB$ and $A'B'$ are equal, that the cuts across the vermilion $BC$ and $B'C'$ are equal, and that the point at which the cuts are widest apart be equal in width to the cleft. The inherent fault of the operation is that it usually produces an upper lip which is too long to be artistic in proportion (Fig. 10). And I feel that any repair that leaves a straight vertical scar down the lip, leaves more of a stigma than one in which the scar is oblique or staggered.

The Thompson operation is also simple to execute (Fig. 2). It is based on principles similar to those of the Rose operation. It recognizes that equal vertical height of the two sides of the lip is essential, and attempts to obtain this by accurate measurements.

The points $A$ and $A'$ which are to be joined to form the floor of the nostril are marked. From these approximated points a measurement is taken vertically downward, so that the point $X$ lies on an imaginary line which would complete the natural curve of the lip. Using this measurement minus $ZX$ (the width of the vermilion) the points $B$ and $B'$ are marked at junction of the skin and mucous membrane. The points $C$ and $C'$ are then marked so that the angle $ABC$ is about equal to or less than 90 degrees and $BC$ equals $B'C'$. This gives raw surfaces which are exactly equal and moreover equal to $YX$.

The fault of this operation in my experience is that although easy to carry out, it usually produces a lip which is too tight along its lower border. Moreover, it does not provide an adequate nostril floor and with subsequent contracture of scar, the nostril is pulled downward.

The Mirault operation (Fig. 3) as originally devised consisted in the principle of turning down a small flap of tissue from the cleft side of the lip into the middle of the finished lip. This principle has been criticized at various times because it displaces muscular tissue into an abnormal position, and from this, it has been argued that abnormal expression would occur on muscular movement. In practice, I have never seen this occur. The operation, I think, is sound because it sacrifices practically no tissue, and instead, places tissue which is usually sacrificed in other plans in the position where it is most needed, namely, along the lower border of the lip. It thus produces a lip whose vertical height is more nearly normal than any other plan, and which is not tight along the vermilion line. It also conserves tissue with which the nostril floor can be reconstructed.

The diagram (Fig. 3) is self explanatory. The distance $AC$ is measured, so that it is a little more than the desired vertical length of the lip. It is then divided by placing the point $B$ half way between $A$ and $C$. The line $A'B'C'$ is made equal to these distances. $D$ and $D'$ are placed so that the distance $CD$ equals $C'D'$. Both are cut obliquely. The two incisions then fit together like a jig-saw puzzle, point to point.

The operation has been refined by Blair especially to take into account the nasal deformity. I have found two difficulties in his plan. It is difficult to produce a smooth vermilion line and to prevent the vertical height of cleft lip from being less than of uncleft lip is a problem.

*The nasal deformity.* I have come to feel that the problem of repairing a harelip is really one of producing as nearly a normal nose as possible. When one considers that the nose is the most prominent feature of the face, and that slight deviations from the normal are extremely noticeable, this point of view I think will be justified. To be an acceptable nose, the following things must be so: The nose as a whole should be in the midline, the columella must be vertical to the mouth plane, the nostril floors should be on the same level, the nostrils should be approximately the same shape and size, and for this to be so the ala must curve inward at its base, with no overhang or buckling of the superior alar border.

To accomplish such a result is not always possible, but one to be striven for. In order to correct the nasal deformity, there are certain things which must be done. Unless the cheeks and alæ on both sides are completely loosened from the maxilla, it is futile to attempt to correct the deformity. The columella must also be loosened from its bony and cartilaginous support. The shape and position of the nostril depend upon the points on either side of the cleft selected for approximation, and the floor of the nostril will be correct if tissue is saved with which to construct it.

### OPERATIVE TECHNIQUE

Ether vapor fed through a hook in the corner of the mouth is the most satisfactory anesthesia. The terrain is then carefully surveyed and the incisions planned. Of prime importance is the selection of points $A$ and $A'$, for on their proper placement depends the final configuration of the nose. $A$ is placed on a line passing obliquely through the base of the columella and perpendicular to a line bisecting the columella longitudinally. Its exact location on this line requires some consideration, but is usually just inside the mucocutaneous junction. $A'$, I believe, is often wrongly selected especially in those instances where there is eversion of the alar lining. It should be just inside and a little below the true lateral border of the ala. If these two points are selected correctly on approximating $A$ and $A'$, the ala does not look as though it had been dragged over to meet the columella, but will curl inward in normal fashion.

When determined, these two points are temporarily tattooed in the skin with methylene blue on a needle. The denuding incisions are then planned and measured, always with the thought in mind that the two sides must be equal in length and equal to a line dropped vertically from nostril

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floor to lip on the sound side. These incisions (or points along them) are tattooed in like manner.

The next step is freeing the cheeks, alæ, and columella from the framework. This is done through intra-oral incisions on either side. I would like to emphasize that this mobilization must be done on both sides, and not just on the cleft side, otherwise a nose displaced from the midline will result. The greater the deformity, the wider the freeing of soft parts must be; bleeding from this step should be controlled by warm packs and pressure. When the soft parts have been so loosened that the nose can be correctly oriented and cleft edges approximated without any tension, the mobilization is considered sufficient.

The next step is making the lip incisions. The direction and course of these depend on the plan and type of operation. They are made with a sharp, pointed knife inserted perpendicularly through the lip. On the medial side of the cleft, the incision is made from above downward to the vermilion border, all the vermilion being left attached until decision is made as to how much of it will be used. On the lateral side, incision is made from $A'$ to vermilion border and then along mucocutaneous line upward until the knife emerges in the cleft. This leaves all the lip tissue attached as a flap to ala and vermilion to lip. It is important to conserve all tissue until the lip is approximated. The raw edges are now approximated by a trial suture placed at $A—A'$. The flap of lip tissue attached to ala is rotated upward and trimmed to form the floor of the nostril. The vermilion flaps are trimmed to form the lip. If any change in plan is necessary, it is made at this time before the conserved tissue is trimmed. Approximation is done with interrupted silk tied on the mucous surface, and interrupted horse-hair on skin surface. Silk has enough tensile strength to hold the repair securely while horse-hair causes little skin scar. A Logan bow is kept on for a period of from 10 to 14 days to keep tension off the healing wound.

### POSTOPERATIVE CARE

These infants are always grouped and matched before operation, and if condition at end of operation seems at all doubtful, a small transfusion is given immediately. Feeding is started as soon as the infant is conscious. This is given with a medicine dropper. If there is any weight loss due to taking formula poorly for the first few days, small saline infusions are used to keep up body fluids.

After various ways of caring for the lip were tried, the following simple method was evolved. No dressing is used. Hands are restrained. For the first few days as crusts of dried blood form they are removed with hydrogen peroxide. If there is any redness along the wound, tiny sponges soaked in warm saline are placed on the lip frequently. The skin sutures are removed in 48 hours to prevent scarring. As soon as these sutures are out, zinc oxide ointment is applied to the lip twice daily. The nostrils are kept clean with tooth-pick swabs. The Logan bow is left on for 2 weeks, and the internal silk sutures are not removed until the third week. Feeding from the bottle is started after final sutures are out.

The baby is sent home with no instructions to the mother other than those of feeding. The baby should be seen every few months for a year and a half, and if any secondary corrections are necessary, these should be done before fixed deformities result. Orthodontia is practically always necessary later, as the upper incisors rarely are in normal position. Most of these children have some deviation of the nasal septum with obstruction to breathing on side opposite the cleft when they get their growth. This can be attended to then.

### THE OPTIMUM TIME FOR OPERATION

There is rather general agreement that harelips should be repaired as soon after birth as possible. Many men believe that operation should be carried out within the first 48 hours after birth. I am not in quite such a rush as this. I think the optimum time depends more on how the baby takes feedings and gains weight. There are a few babies who nurse poorly and fail to gain until the lip is repaired. Most of them have difficulty for a week or so, but soon learn how to suck a large nipple with big holes successfully. If the baby thrives, I would just as soon wait until 4 to 6 weeks before operating. There is less operative mortality and more lip to work with at this age. The premaxilla will still be successfully molded by the lip even after 2 months. However, I see no point in waiting more than 6 weeks, and feel that the family physician should instruct the parents to have repair done in the first month.

The child should be in good physical condition, especially the upper respiratory tract, before operation. A running nose is a definite contraindication to repair. Blood should be available for transfusion, as it is occasionally needed immediately after operation.

# REPAIR OF TRAUMATIC FISTULAS OF STENSON'S DUCT

HAROLD GLASCOCK, M.D., and HAROLD GLASCOCK, Jr., M.D., Raleigh, North Carolina

THE repair of fistulas of Stenson's duct comes to few surgeons who do not deal with large numbers of traumatic cases. Yet it is a problem which may suddenly confront any surgeon. It is fortunate that accidents to Stenson's duct are not frequent because its repair is difficult and cosmetic effects must seriously be considered.

The following case is being reported because we have had excellent results with a modification of the technique described by Homans. We are familiar with the technique of end-to-end suture by extension of the incision along the duct as well as the various techniques of Kaufman, Nicoladoni, Braun, and Langenbeck. All of these usually produce large scars in addition to the lesion already present. Our method is not radically new, but we believe that may serve well in those cases in which early operation follows division of the duct.

Our method consists of passing a metal probe from the buccal opening through the distal portion of the severed duct, the probe coming out through the wound in the face (Fig. 1). A thread is then wrapped around the end of the probe, both ends of the thread being left long. The probe is pulled back through the duct, thus drawing the loop of thread into the mouth. The end of a piece of extra coarse silkworm gut is then bent and hooked into the loop of the thread and the thread is then pulled back through the distal end of the duct, the silkworm gut being drawn with it.

The patient is given lemon juice to stimulate the flow of saliva and in this way the proximal end of the injured duct is found. The same probe is inserted into the proximal end of the duct, passed to the parotid gland, and forced through the substance of the gland. Where the probe points the skin is nicked sufficiently to come through to the surface. The thread is again wrapped around the probe and pulled through the proximal end of the duct to the wound. The same piece of silkworm gut is hooked in the loop of thread, and the thread is drawn through the proximal end of the duct and parotid gland, the silkworm gut being pulled with it. This places the silkworm gut completely through Stenson's duct and the parotid gland. To hold the silkworm gut in place, a shot is applied at each end. The wound in the face is sutured tightly with horsehair.

The wounds are cared for in the same manner as are any other wounds of the same nature. The silkworm gut is left in place for a period of 4 to 6 weeks, thus encouraging the formation of a wide channel.

Following is the report of a case.

### CASE REPORT

G. J., negro, male, aged 30 years, received a vertical laceration about 3 centimeters in length on the left side of the face just below the malar eminence. The wound bled rather profusely. He was taken to the hospital. Hemorrhage was controlled by means of ligatures and the wound was closed with the hope that the duct had not been injured. However, the following day the patient reported that the dressing became very wet following each meal.

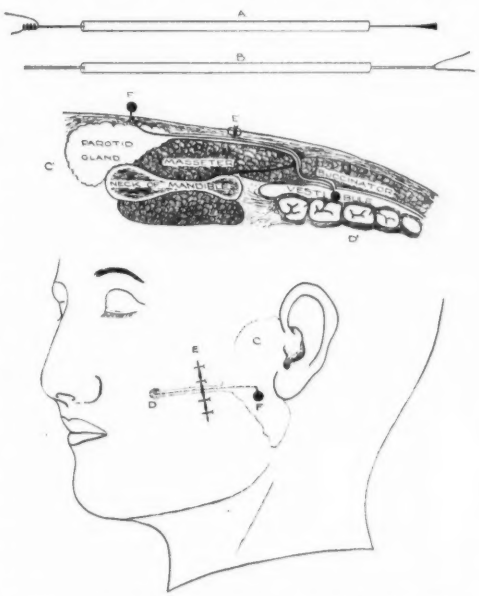


Fig. 1. *A*, Probe passed through duct with thread wrapped around the end to be pulled through the duct. *B*, Silkworm gut hooked on the thread to be pulled back through the duct. *C*, *C'*, Parotid gland. *D*, *F*, and *D'*, *F'*, Shots on the silkworm gut which has been passed through Stenson's duct and the parotid gland. *E*, Sutured wound.

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Hence injury to the duct was established beyond doubt. It was decided to allow the wound to heal and see if the fistula would close of its own accord. The seromucous discharge continued, and surgical repair was decided upon. The existing wound was opened under local anesthesia and the technique described was carried out. Saliva began to follow the silkworm gut into the mouth almost immediately. No saliva came through the proximal opening in the skin behind the gland, and very little through the repaired fistula site. There was only slight interference with the patient's comfort. The silkworm gut was removed 4 weeks following operation. Only the scar of the laceration and a very small scar where the silkworm gut was brought out at the gland, exists.

In a follow-up after 1 year the patient states that the gland and duct are functioning normally.

## CONCLUSION

1. A modification of Homans' method for repair of traumatic fistulas of Stenson's duct is reported.

2. The bringing of the silkworm gut out through the gland is an important part of the technique.

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# THORACOPLASTY WITHIN THE SANATORIUM

PAUL D. CRIMM, M.D., F.A.C.S., DARWIN M. SHORT, M.D., and
CLARENCE S. BAKER, M.D., Evansville, Indiana

NUMEROUS institutions caring for the tuberculous sick are located a great distance from clinics and medical centers where thoracic surgery is performed. It therefore becomes desirable for certain of the sanatoria to add the necessary surgical procedures to their armamentarium, if in the future they are to continue operation in the full interest of patients affected with diseases of the chest.

It is advantageous to do surgery in the same institution because long periods of bedrest are required between minor collapse procedures, which are essential before major surgical collapse is instituted. The pre-operative and postoperative care can be followed intimately and more understandingly in the institution where tuberculosis is treated and all facilities are available to meet the vicissitudes of the tuberculous patient. If the patient is moved to a general hospital his stay must be, of economic necessity, as brief as possible. The patient is ofttimes returned to the sanatorium where follow-up supervision by the surgeon is unwillfully neglected.

In this series, 180 operations were performed on 100 consecutive patients with pulmonary tuberculosis. Ages ranged from 16 to 65 years. Fifty-six were women and 44 were men. The operative mortality was nil. There were no postoperative deaths earlier than 4 months. All patients were hospitalized in the sanatorium and thoracoplasty was the final operative procedure indicated. This was instituted in an endeavor to prevent them from being permanent bed-patients, or continuing throughout life as infectious hazards to their families and communities.

## ANALYSIS OF CASES

Of the 100 cases, 24 were moderately advanced and 76 were far advanced cases of pulmonary tuberculosis. Sixty cases had cavities at least 3 centimeters in diameter, while 26 cases had smaller but generally multilocular cavities. In 14 cases, if cavitation was present, it was hidden by dense infiltration, frequently of long duration. Five cases had cavitation in the lower lobes. There were 2 cases with bilateral cavitation in the upper lobes. Seventy cases had infiltration in the contralateral lung ranging from a minimal lesion to moderately advanced. Eight had a few areas of calcification in the contralateral lung, which were of the primary type. The 22 cases remaining had no evidence of disease in the opposite lung, either by x-ray or physical examination. In 12 per cent of the tuberculous cases admitted to this hospital the patients were ultimately recommended for thoracoplasty.

Positive sputum prior to thoracoplasty was found in 94 per cent of the cases. To date 80 per cent of the 94 patients with positive sputum, who are now living, have a negative sputum; 11 per cent continue to have a positive sputum.

Nine per cent of the 100 cases are deceased over a 4 year period. Four of the nine deceased had a negative sputum prior to death. The various causes of death are as follows: brain abscess, 1; chronic nephritis, 1; typhoid fever, 1; and 1 committed suicide following a postoperative psychosis. Of the 5 who had a positive sputum prior to death, 3 died of tuberculous pneumonia in the opposite lung; 1 of tuberculous tracheobronchitis; and 1 of self-destruction (Table I). Of the 91 patients living, 5 have no activity other than bathroom privileges, 27 have limited activity, and 59 are working (Fig. 1).

In this series there were 45 patients who had received pneumothorax prior to thoracoplasty. The duration of the collapse in these cases is as follows: 28 cases for 6 months or less; 10 cases, 6 months to 1 year; 3 cases, 3 years; and 1 case for 5 years. Of the total number of patients receiving pneumothorax, 53 per cent developed fluid and 9 per cent pyopneumothorax. Except for one, none of these pneumothorax cases manifested a negative sputum following this form of therapy. In 1 case the pneumothorax was of 5 years' duration, which rendered the lung unable to re-expand and a thoracoplasty was indicated to obliterate the pneumothorax cavity.

Pneumothorax in the opposite lung is indicated in any early spread of disease, in spite of the fact that a spontaneous collapse may be a complication. The risk of spontaneous collapse is far less than that caused by an extension of the disease and ultimate death. In 5 of the cases reported patients are now taking pneumothorax in the opposite side and of this number 4 have a negative sputum. Pneumothorax was started in 1 case

From Boehne Tuberculosis Hospital, Evansville, Indiana.



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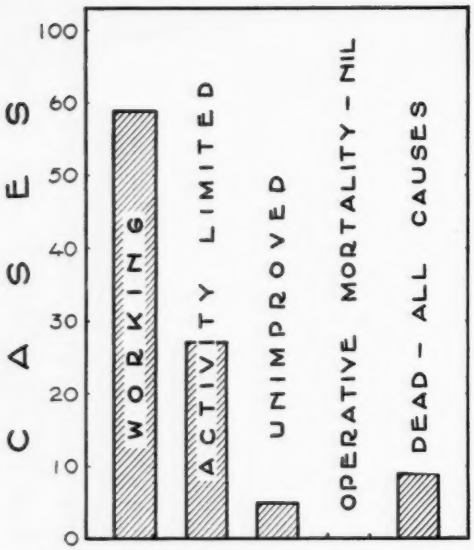


Fig. 1. Postoperative results in 100 cases of thoracoplasty (180 operations) over a 4 year period.

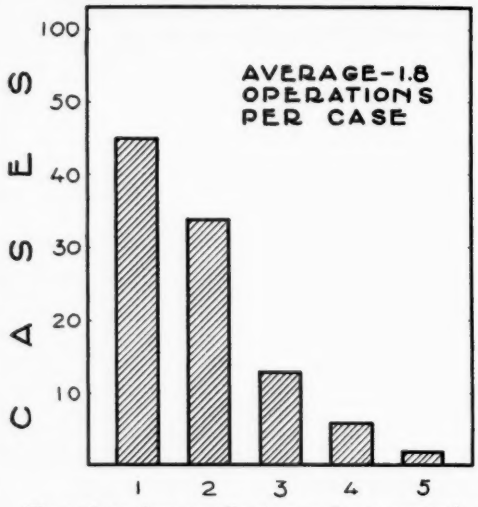


Fig. 2. Operations according to stages in 100 consecutive cases of thoracoplasty.

in opposite lung 1 year in 2 cases 2 years, in 1 case 4 months, in 1 case 2 months after thoracoplasty.

Phrenic nerve operations were performed on 11 per cent of the cases. Four patients had a phrenicectomy 2 years prior to thoracoplasty; 3 cases, 6 months prior; 3 cases, 1 year; and 1 case, 1 month. In the authors' opinion it is doubtful if any of these patients were benefited by the phrenicectomy. From the senior author's experience and results it is believed that phrenic nerve interruption is not necessary in the majority of patients with tuberculosis. If possible, a partial pneumothorax is a much wiser preparation for thoracoplasty than phrenic nerve operation. Permanent interruption of the phrenic nerve diminishes vital capacity which cannot be replaced when it is needed in the future management of the case.

There were 3 cases of bilateral thoracoplasty performed after the method of Allen, and 2 of these had a subsequent paraffin plombage on one side in preference to resecting further lower ribs and reducing the vital capacity. Paraffin plombage, in our opinion, has a very definite place in completing the closure of residual cavitation. By this method the patient can still have the advantage of a partial thoracoplasty with conservation of vital capacity. Adequate collapse with minimum reduction of vital capacity should be the operator's prime consideration.

Of the 180 operations, 153 were performed from the posterior approach, and 27 anterior thoracoplasties and costectomies were performed before or after the posterior operation. The anterior operation is advantageous as a primary operation. It gives the surgeon an insight as to the operative risk of the patient. It ofttimes reduces the production of sputum. It permits a greater number of ribs to be removed *in toto* at the second or posterior operation. Frequently it is necessary to wait several months before a second posterior operation is performed, whereas it is seldom necessary to wait longer than 2 or 3 weeks after the anterior operation. In our experience many patients can withstand an anterior operation of four costal sections, followed in 2 or 3 weeks by five posterior sections, much better than they can tolerate the entire first three ribs being removed during one operation. Forty-five patients had a one stage operation at which time three to five ribs were removed, occasionally six, but seldom seven. Thirty-four patients had two operations with removal at the second operation of three to five ribs, but seldom six. Thirteen patients had 3 operations; 6 had 4; and 2 had 5 (Fig. 2). Numerous stages were necessary because insufficient collapse resulted from the prior operations. In these cases either regenerated ribs were resected, or else the patient had empyema which necessitated the removal of regenerated ribs and parietal pleura. Only a small area of pleura and rib was resected

at one time, which in turn diminished the operative risk.

COMPLICATIONS

Pneumonic consolidation of the lower lobe (operated upon side) due to bronchiogenic spread following an upper stage operation was manifest in 3 cases. After the disease in the lung operated upon was apparently arrested 5 patients developed active infection in the opposite lung. Two of these had no previous evidence of infiltration. Four responded to pneumothorax in the opposite lung and 1 died, due to delay in seeking medical advice. One case had a marked shift of the mediastinum and extreme dyspnea and tachycardia, with stabilization in 4 days. The raising of tenacious sputum was a serious complication in 1 case which had a tuberculous tracheobronchitis. The absence of contralateral pneumonia in this series, in the writers' opinion, can be attributed to meticulous care as regards pre-operative drainage, choice and administration of anesthetic, and the duration of the operation.

In many cases a slight injury to the brachial plexus was manifested after the posterior upper stage. This was evidenced by hyperesthesia or paresthesia along the medial surface of the arm, forearm and hand. These symptoms disappeared, usually within a week, and without residual. Five patients experienced pain because the tip of the scapula became impacted beneath the adjacent ribs. This either disappeared or was remedied at subsequent resections. Two patients developed a mild wound infection. Delayed healing of the wound due to aseptic necrosis of the skin on the axillary side was experienced in 15 cases. Stitch abscesses occasionally occurred but were of no consequence. There was one acute genitourinary infection which rapidly subsided.

A pleuroesophageal fistula with massive empyema existed in 1 case. Subsequently this was successfully closed following the second stage. One patient became critically ill with amebic dysentery 2 days following operation. This was controlled with emetine therapy. Another patient developed a periodic tic of the diaphragm the second day after operation, first stage, upper. Respiration was atypical, resembling a Biot type. The administration of carbon dioxide gave some relief with total disappearance of the symptoms in 18 hours.

A majority of the patients exhibited signs of mild shock, the systolic blood pressure dropping to 100 to 80 millimeters mercury, depending upon the anesthesia. Cyclopropane causes a slightly greater fall of the systolic pressure than does nitrous oxide-oxygen. The use of cyclopropane is a distinct advantage for the following reasons: (1) better relaxation with a wider margin of safety is possible, without increasing the respiratory embarrassment; (2) no restriction of oxygen is necessary to maintain a profound anesthesia as is the case with nitrous oxide-oxygen; (3) a large percentage of oxygen with a small measured quantity of cyclopropane maintains good anesthesia, without marked changes in blood pressure during operation.

In this series, 2 patients required blood transfusions after operation, although routinely 2,000 cubic centimeters of normal saline is given by hypodermoclysis immediately after every operation. Circulatory and respiratory systems were critically checked and supported during the first 18 hours after operation. A careful examination was made before operation of the vital capacity, the cardiac and renal functions. Patients with a low vital capacity are relatively good risks, provided they are free from any myocardial or renal damage. Young patients whose vital capacity is between 900 and 1,000 cubic centimeters may be operated upon without grave risk. Older individuals, past 50 years of age, should have a vital capacity of at least 1,500 cubic centimeters if postoperative complications are to be avoided.

INDICATIONS AND CONTRA-INDICATIONS

An early tuberculous pulmonary infiltration contra-indicates the employment of thoracoplasty, except in a case in which hemorrhage cannot otherwise be controlled. Such an infiltration which has been subjected to approximately 6 months' bedrest, with or without supplementary pneumothorax, usually manifests sufficient fibrosis and resolution for a major collapse. The extent, character, and distribution of infiltration must finally decide the time of operation. A tuberculous process which has tended to heal with resolution, cavitation, and fibrosis over a period of 6 months to 2 years makes the patient a far better surgical risk.

In evaluating a candidate for thoracoplasty one cannot rely on any single criterion. The most reliable criteria are the stereoscopic x-ray findings. For example, a patient may have essentially a normal blood sedimentation rate, a normal Arneth index and Schilling count, and be obviously improved clinically, but the x-ray may show a very soft infiltration which should not be collapsed until further resolution and fibrosis is evident. In advanced disease in which thoracoplasty is inevitable it is advisable to prepare the patient for that procedure as early as the above stated criteria will permit.

TABLE I.—CAUSES OF DEATH AND POSTOPERATIVE INTERVAL FOLLOWING THORACOPLASTY

| Cause of Death | Interval | Cases |
|---|---|---|
| Brain abscess | 1 yr. | 1 |
| Chronic nephritis | 3 yrs. | 1 |
| Suicide | 4 mos. | 1 |
| | 1 yr. | 1 |
| Typhoid | 3 yrs. | 1 |
| Tuberculous tracheobronchitis | 2 yrs. | 1 |
| Tuberculous pneumonia | 2 yrs. | 2 |
| | 3 yrs. | 1 |
| Total | | 9 |

As a rule, pneumothorax should be attempted as a therapeutic test prior to any plastic operation on the chest. The information as to the presence or absence of adhesions, ofttimes cavitation, flexibility of the mediastinum, as well as the response of the opposite lung, can be obtained by the introduction of air into the pleural space. Thoracoplasty performed over a lung which can be collapsed with air may end disastrously with a mediastinal flutter. Thoracoplasty, therefore, is not a substitute for other collapse procedures. The use of pneumothorax, if only partially successful, hastens resolution and the development of fibrosis. Development of fluid aids in fixing the mediastinum and adhesions formed after decompression diminish the collapse of the normal lung tissue which is proximal to the infiltrated area. Partial pneumothorax, together with partial thoracoplasty on the same side, in the writers' experience, is not a successful procedure, but may be used to temporize a bronchiogenic spread.

An upper partial thoracoplasty followed by a pleural plombage in the same side, if necessary, is preferable and more conservative than an upper stage thoracoplasty and phrenic nerve operation. Pleural plombage used in this manner conserves a patient's vital capacity. The operation is indicated as soon as adhesions develop following a thoracoplasty.

Conservation of vital capacity, commensurate with adequate closure of the infiltrated area, is essential in any case of tuberculosis. Tuberculosis is a disease which progresses in a series of accidents and the successful management depends on anticipating these accidents. The conservation of as much normal lung tissue as possible for any subsequent spread of infection is paramount in selecting operative procedures. For example, a phrenicectomy might assist a patient in healing a minimal apical lesion. Several years later if disease develops in the opposite lung the patient may require a pneumothorax or later a thoracoplasty, or even a bilateral thoracoplasty. The previous phrenic nerve operation has diminished the vital capacity which now is gravely needed. In reviewing such a case one wonders if the earlier phrenicectomy was either imperative or a wise procedure. In view of such possibilities the authors are opposed to permanent interruption of the phrenic nerve unless unilateral disease demands a complete collapse. The longer one can keep both diaphragms intact the more surgical procedures the patient is able to withstand later on. Graham states that pneumothorax is a more valuable procedure than phrenicectomy and is in the habit of attempting pneumothorax in every instance before undertaking phrenicectomy. Certainly a phrenic nerve operation should not be substituted for pneumothorax, or performed prior to pneumothorax, if the patient is to be treated conservatively. However, a permanent interruption of the phrenic nerve may be indicated in decompressing a pneumothorax and in protecting closed cavities of the re-expanded lung. It also aids in re-adjusting the mediastinum in a patient with marked contraction to the side operated upon, or it may assist in eliminating pockets of empyema. In this series the procedure of Alexander has not been used. He recommends primary radical phrenicotomy and secondary resection of the upper seven ribs in order to reduce aspiration pneumonia. Generally speaking, the authors believe that far too many phrenics are interrupted without due consideration of the ultimate procedures.

In a number of cases thoracoplasty was admittedly used, not to effect a cure, but in an endeavor to improve the status of the hopeless case, by reducing sputum and toxic symptomatology. A case of long standing frequently gives an excellent result as far as the collapse of tuberculous infiltration is concerned, yet a concealed lesion in the kidney, intestine, or opposite lung, may become activated in the future. The life of these patients is often prolonged, yet the results never add to the statistical success of thoracoplasty.

In collapse therapy there is too much overemphasis of single procedures which may be used in effecting the cure of tuberculosis. This overemphasis may be proportionate to the availability of the different procedures. If such is true the patient is allowed to pass the opportune stage for a certain collapse procedure just as he passes insidiously from a minimal to a far advanced stage of the disease. Too often the recommendation of a procedure like thoracoplasty comes to the patient as a last resort rather than an early aid toward a cure.

## SUMMARY

1. In this series, 180 thoracoplasties were performed in the sanatorium on 100 consecutive pa-

tients with pulmonary tuberculosis. There was no operative mortality.

2. Of the 100 patients, 24 were moderately advanced and 76 were far advanced cases of tuberculosis. Over a 4 year period 9 cases are deceased; 5 have no activity; 27 have limited activity; and 59 are working.

3. Pneumothorax is advocated as a prerequisite in preparing many patients for thoracoplasty.

4. Thoracoplasty with pneumothorax in the contralateral lung, when indicated, either before or after operation, is a safe procedure.

5. If preliminary phrenicectomy is indicated prior to thoracoplasty, only temporary phrenic nerve interruptions are recommended.

6. Pleural plombage used as a subsequent procedure to thoracoplasty diminishes residual cavitation and precludes further rib resection.

7. Anterior thoracoplasty and costectomy prior to posterior thoracoplasty reduces surgical risk and lessens the interval of time between operative stages.

8. It is advisable to be somewhat more radical in selecting the time for performing thoracoplasty, and in turn become more conservative in safeguarding the patient's vital capacity for future breakdowns.

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# RESTORATION OF THE ENTIRE SKIN OF THE PENIS

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THERE are apparently only infrequent instances of loss of the skin of the penis, but the defect is a very acute problem to the patient, and the repair may present difficulties in the selection and application of suitable skin covering.

In three of the four instances recorded here, free thick split skin grafts have given permanent healing with complete normal sensation and function. In the fourth patient, split grafts were used to supplement scrotal flaps and to repair the defect on the scrotum. Free full thickness grafts would give just as good results as the thick split graft, but, in this area, as in other parts of the body, the possibility of a "full take" in a contaminated field is much greater with the thick split graft than with the full thickness graft.

Pedicle flaps from the scrotum may be used to cover partial surface defects, and also where there has been damage to the cavernosum, with deep scarring and contracture, so that a thicker restoration is desired than that which a free skin graft would give (Fig. 5). But the available scrotal tissue is not usually great enough for total resurfacing, and, during the period of attachment of the flap, there may be too much retraction of the penis and flap, with a resultant bulky, thick surface covering. This same fault may be found with pedicle flaps from other areas, and there will, almost undoubtedly, be obtained a less normal appearance and sensitivity than the free graft gives.

The two patients whose complete restorations with thick split grafts are shown in Figures 1 and 2 had suffered complete loss of the skin of the penis following circumcision. Because it was thought best to do as little suggestive recording as possible of the unfortunate situation, preliminary photographs were not taken, but, on examination of both patients when first seen, the penis was found to be pulled up to the abdomen in a curled knot. Excessive cellulitis and sloughing were present, and the patients were in extreme discomfort physically and mentally. The covering of the glans was intact in both, but there was no skin left in either except about 1 or 2 square centimeters on the ventral surface of one.

*Pre-operative preparation of ulcerated cases.* It was determined immediately to use free thick split skin grafts, and the main preparation was a saline bath in which the patient remained 3 to 6 hours a day, the same procedure being used as has been described for burned patients (1, 2). It is possible that this treatment was even life-saving, for, when first seen, there was no conjecture as to how bad the infection might become. This simple procedure plus the daily use of soap and water and painting the raw surface with mild antiseptics was the complete preparation up to the time of operation.[1]

*Operation.* The surface granulation and deep scar tissue is carefully dissected away in layers until the penis can be completely elongated, extreme care being used not to enter either corpora cavernosum or urethra. This procedure should be most painstaking, as complete relaxation of the scar and the necessity of obtaining a suitable surface for the graft are of first importance.

The next most important step is to obtain a free, thick split skin graft, of about one-half to three-fourths the thickness of the skin of the thigh, in one piece, large enough to cover the penis completely without the necessity of patching any place (Fig. 3).

A catheter is inserted and one assistant holds the penis completely extended on the catheter. The graft is wrapped carefully and smoothly around the penis, the edges being overlapped to assure complete coverage. It is then sewed accurately in place all around the penis, at the corona and at the abdomen, and then down the line of overlap of the edges, with fine horsehair on fine needles. Further sutures are put through the surface of the graft with very shallow catches in the penis so that it is firmly anchored and mattressed in place. Multiple stab holes are put through the graft, and all blood is expressed.

Fine mesh gauze is wrapped smoothly around the extended penis, and then a gauze flat is wrapped securely on with a sterile bandage so that the penis is held in complete extension on the catheter. An irrigation tube is placed alongside the penis, moist gauze sponges are carefully built up from all sides around the penis, and a marine sponge pressure dressing is applied by means of a double spica of gauze rolls. The whole dressing is firmly fixed to prevent any slipping or twisting.

From the Department of Surgery, Washington University School of Medicine

[1]The success in both of these patients was due, in a large part, to the work of Dr. Norman Hall, assistant resident surgeon at Barnes Hospital.

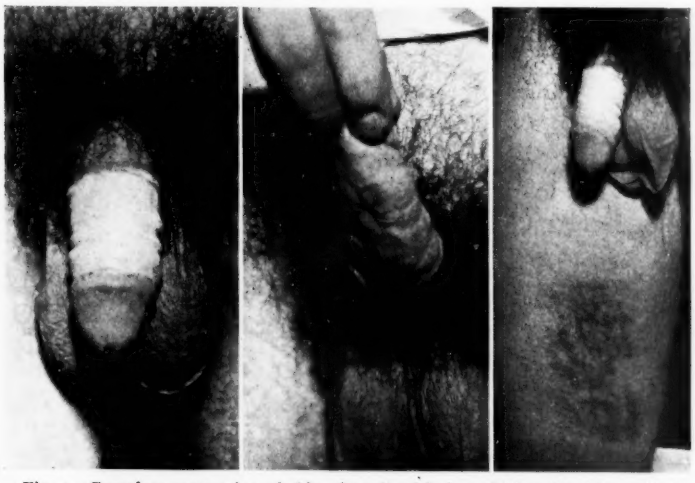

Fig. 1. Complete restoration of skin of penis with free thick split skin grafts in one operation. Sensation and function normal. Shows also donor site on leg.

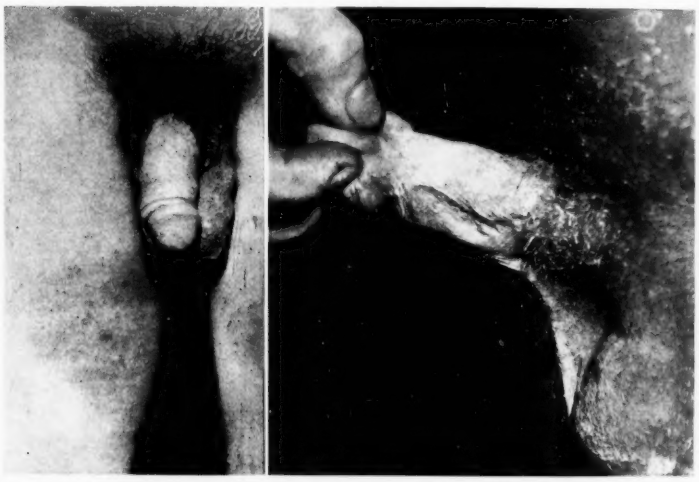

Fig. 2. Complete restoration of skin of penis with free thick split skin graft in one operation. Sensation and function normal. A small amount of redundant skin was removed at a second operation.

The tip of the glans is left exposed to be sure of circulation, and the extended penis is now in somewhat of a cast with the catheter left in place, at right angle to the abdomen.

If it is thought that a wet dressing is not necessary, the first gauze against the graft can be of 5 per cent xeroform, or some other ointment, and the irrigation omitted.

*After-care.* The dressing is kept moist with saline, added through the irrigation tube, and is carefully taken off after 4 or 5 days. All sutures are removed, dead edges are trimmed away, and any blisters or infected areas are opened. Silver nitrate, 1 per cent, or some mild mercurial antiseptic, may be used locally and a firm grease gauze dressing carefully reapplied in an attempt to keep

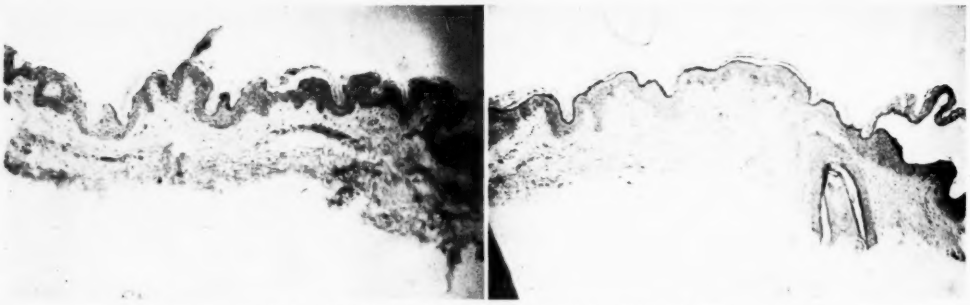

Fig. 3. Photomicrographs of thick split skin grafts which were used in patients in Figures 1 and 2. The grafts are about two-thirds of the full thickness of the skin.

the penis still extended for a few days. If there is much cellulitis present, a wet dressing should be maintained.

Later, if sebaceous collections occur in the graft, they should be emptied out by pressure or through slight incisions. If too much contracture either circumferentially or longitudinally should occur, more skin could be put in by simple incision of the graft, the edges being expanded and the defect filled with a scrotal flap or free skin graft.

Fig. 4. Healed granuloma inguinale with penis completely buried in scrotum but intact except for complete loss of skin. Restoration of skin covering with scrotal flaps, and supplemental thick split skin grafts for the base of the penis and the scrotum.

SUMMARIES OF CASES

The patient shown in Figure 4 was seen, after an extensive granuloma inguinale had healed, with the penis completely buried in the scrotum. Urine came through 7 small fistulas, and, according to the patient's observation of the ulcerative and healing process, it seemed certain that the penis was actually present; and added to this, was the patient's assurance that normal erections occurred. At operation a penis of very large size was found in its scrotal bed with no sign of any skin covering whatever, but with the covering of the glans intact. The penis was brought out of the scrotum, and there was left attached a large scrotal flap that was wrapped around and united

Fig. 5. Shows use of scrotal flap for partial restoration. The penis has been dissected free from a contracture into the right inguinal region, and the flap has been rotated up from the scrotum to fill the defect. The original lesion was a gunshot wound.

on the ventral surface. At a second operation, two more lateral scrotal flaps were rotated into the base of the penis after it was freed. This left the penis out of the scrotum but shortened and pulled in close to the abdomen with the scrotum elevated. Then, at a third operation, the whole contracted area was opened so that the penis could be completely extended, and the resultant raw area was covered with a thick split skin graft 11 by 22 centimeters. The patient left the hospital in excellent condition and apparently satisfied but would never return for examination or photograph.

Another patient[1] was seen with active ulcers of granuloma inguinale, which had failed to heal under medical and x-ray treatment. The ulcers were destroyed with the cautery over wide areas, and, after granulations had formed, the repair was done with free thick split grafts. Two stages were necessary because large areas had to be grafted in the inguinal regions and because one of the ulcers was so close to the urethra that it was not grafted at the first stage. This patient finally became entirely healed but subsequently presented the same disease about the lips (3).

[1]This patient was taken care of by Dr. George K. Lewis.

## CONCLUSION

When the skin of the penis has been lost, it is thought that free thick split grafts may suffice in most instances for a suitable repair; and they might be used to effect early healing in ulcerated cases, even if a thicker pedicle flap repair might have to be done at a later date.

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# SPINDLE CELL BLADDER SARCOMA

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PROBABLY 90 to 95 per cent of tumors of the urinary bladder are of epithelial origin. Primary sarcoma of the bladder, estimated to comprise about 4 to 5 per cent of the malignant tumors of this viscus, is of great interest on account of its comparative rarity; secondary metastatic sarcoma is extremely rare and less than 10 such cases have been reported in the literature. But the rarest and most interesting tumors of the bladder are those of mixed structure which show histologically cells of both epithelial and connective tissue origin. Only a very few of such tumors of the bladder have been reported in medical statistics. The following case of this type has been recently observed.

## CASE REPORT

Patient S. C., age 38 years, married, was referred to the Alexian Brothers' Hospital, Chicago, section of urology, November 7, 1936. He gave a history of trauma resulting from a fall 5 months prior to his entrance in the hospital. He claimed to have fallen from a truck a distance of about 4 feet and struck the pavement on his right side. Following the foregoing he complained of right renal pain and transient hematuria. A loss in weight of 10 pounds was reported during the past 5 months, and the following urinary symptoms in increasing proportions, namely, dysuria, nocturia, urgency, hematuria, and marked suprapubic discomfort.

The patient was visibly cachectic, anemic, and presented a greatly distended bladder. Cystoscopic attempts resulted in failure due to excessive hemorrhage, clots, and villus-like tumor processes which were in abundance in the bladder washings. Excretory pyelography presented a complete absence of right renal or ureteral shadows whereas the left kidney and ureter were within normal limits.

Suprapubic cystotomy was performed. A large fragile mass of tumor tissue was found to fill the bladder completely. The mass was gray pink in hue, necrotic, and bleeding profusely. The base was broad, firm, and not unlike cartilage in consistency. The cauliflower-like, necrotic tumor masses were removed by forceps and a firm wide cartilaginous base was thoroughly fulgurated including a wide area of apparent normal bladder mucosa. The base of the tumor was approximately 8 centimeters in diameter and included the right ureteral orifice, which was completely occluded. The inevitable suprapubic fistula was established; patient submitted to routine irradiation.

On January 11, 1937, about 2 months following his entrance in the hospital, a large area of necrotic hemorrhagic tumor tissue appeared at the suprapubic opening and on examination the bladder was again partially filled with recurrence of the tumor which was thoroughly removed and a second fulguration was performed. The patient is rapidly losing ground and a fatal termination is expected by metastases, exhaustion or embolism.

*Microscopic report.* Section 1. Imbedded with loose fibrillar and moderately vascular connective tissue there are fairly well circumscribed islands of long spindle shaped cells which arrange themselves in the form of interlacing bundles. The nuclei of these cells are oval, moderately rich in chromatin, and mitotic figures are frequently found. In the center of some of these islands one finds groups of irregularly shaped cells with ample clear cytoplasm. There are single islands in which the latter variety of pleomorphic cells predominate and in which there is a more marked variety in size, shape, and structures of the nuclei (Figs. 1 and 2).

Section 2 consists of a very vascular hemorrhagic and partially necrotic tissue which encloses islands of large polygonal cells with distinct outlines and oval nuclei rich in chromatin. There is a moderate number of mitoses with irregular short and plump chromosomes (Figs. 3 and 4).

Other sections revealed a diffuse overgrowth of pleomorphic cells. In places the cells formed cords and were polygonal or elongated with ill defined cell outlines. In other places the cells were elongated to spindle shape and separated by thin strands of a finely fibrillar tissue. In other areas mitotic figures were numerous.

Diagnosis: Transitional cell sarcoma with sarcoma-like areas. The first section suggests a diagnosis of spindle cell sarcoma while the second section shows a squamous cell carcinoma. In another section transition between the two extremes is found and it can be clearly seen that by becoming elongated and arranging themselves in fascicles the carcinoma cells assume a sarcomatous appearance.

Sarcoma of the urinary bladder is indeed a rare entity. The first case histologically verified as a spindle cell sarcoma is ascribed to Senftleben in 1801. Gabe states that Guersant reported a case in 1853; unfortunately, no mention is made of histological proof. Wilder in 1905 searched the literature and reported 50 cases of sarcoma of the bladder with reasonable histological verification of the diagnosis. Of these, 21 cases were of large or small round cell type and 5 cases were mixed cell type (spindle and round cells).

Scholl in 1922 found only 1 sarcoma in 262 bladder tumors seen at Mayo Clinic. Munwes in 1910 collected 107 cases in the literature and reported a personal case. In 1929 McCarthy and associates increased the total to 128 cases and since then one or two isolated cases have appeared in medical publications each year, so that less than 150 cases have been recorded to date.

All histological types have been reported–spindle cell, round cell, mixed cell, alveolar, angiosarcoma, fibrofusocellular, myosarcoma and myxosarcoma, lymphosarcoma, and osteochrondrosarcoma. Dr. Jaffe in his report of the pathological sections stated that these tumors are always questionable, difficult of differentiation, and have been recently noted in thyroid malignancies.

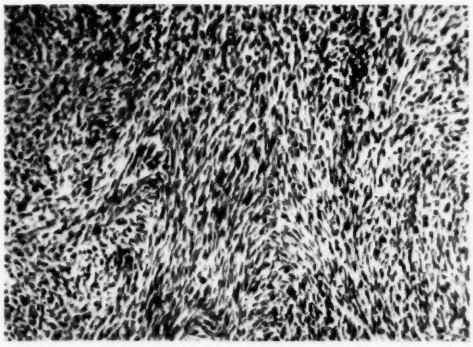

Fig. 1.

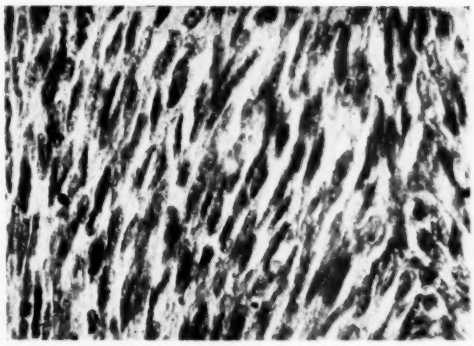

Fig. 2.

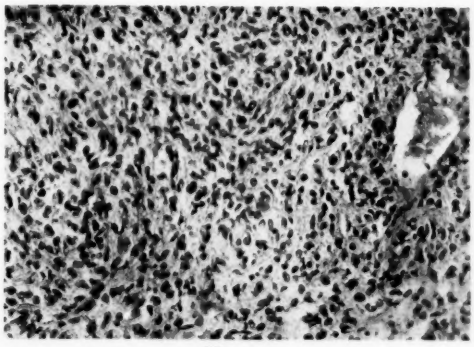

Fig. 3.

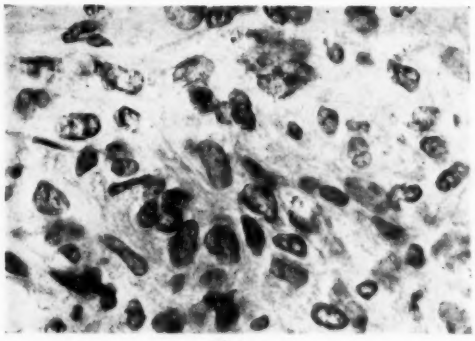

Fig. 4.

Fig. 1. Spindle cell sarcoma-like section, an example of tissue in which, imbedded with loose fibrillary and moderately vascular connective tissue, there are fairly well circumscribed islands of long spindle shaped cells which arrange themselves in the form of interlacing bundles.

Fig. 2. High power of Figure 1.

Fig. 3. A second section illustrating the transitional cell carcinoma. Large polygonal cells with distinct outlines and oval neuclei rich in chromatin are evident.

Fig. 4. High power of Figure 3.

The question of the possibility of the occurrence of epithelioid sarcomatous tumors has passed beyond the stage of speculation; they are observed in the uterus, breast, testis, thyroid, and in certain other glandular structures, also other regions of the body where both types of tissue cells may be present, either as part of normal structures or as embryonal rest cells. In the urinary bladder, such a mixed cell tumor is obviously unusual. The preliminary pathological section made in the case before us was clearly a spindle cell sarcoma and as such was diagnosed by one of our most distinguished pathologists. However, after further pathological study and serial section analysis, the fact was firmly established that we were dealing with a questionable type which resulted in a diagnosis of spindle cell epidermoid sarcoma.

In the literature cases of epithelioid sarcoma of the urinary bladder have been reported by Kraft, Krompecher, Lenormant, Borst, Parmenter, and Gabe.

Gussenhauer and Billroth reported myosarcocarcinoma and Albarran an adenosarcoma. In the 2 cases the tumors were probably derived from allantoid remnants at the bladder dome. Kraft's case was in a man 78 years of age. A small tumor was removed from the bladder wall by the intraperitoneal route; rapid recurrence followed which resulted in a mass the size of a fetal head. Upon histological examination the presence of epithelial and sarcomatous elements was demonstrated.

Lenormant reported an epithelioid sarcoma of the bladder probably of allantoic origin. Histologically it showed in parts a sarcoma with fusion cells and in other areas epitheliolated or alveolar tubules with cylindrical cells. The tumor was found in a woman 58 years of age and weighed 570 grams. In commenting upon Krompecher's case

and his own, Borst postulated the following possibilities:

1. That a sarcoma and carcinoma may arise independently in the same area and ultimately fuse.

2. That the mixed tumor begins as a carcinomatous epithelial growth and the stroma at the same time becomes sarcomatous.

3. That a carcinoma develops in which the stroma gradually becomes sarcomatous.

4. That rarely, the tumor is at first a sarcoma and later the overlying epithelial structures become carcinomatous.

Parmenter's patient was a 64 year old female. In this case various microscopic sections of the bladder tumor showed large spindle cells and irregular masses of stratified squamous epithelium with cell rests. In Gabe's case the pathological report stated that the tumor mass suggested a polymorphous cell sarcoma. Parts consisted of trabeculæ of spindle cells and other parts contained solid trabeculæ of polygonal carcinoma cells; however, the growth could be accepted as a mixed carcinoma and sarcoma. From the available evidence it was difficult to decide whether the tumor was primarily a carcinoma undergoing sarcomatous degeneration; whether a carcinoma and sarcoma had arisen simultaneously; or whether the growth was carcinoma undergoing a typical degeneration; the spindle cells and the giant cells being the expression of a defense reaction to the carcinoma cells. The irregularity of the nuclei of the spindle cells, the presence of mitoses, and the absence of well formed blood vessels were in favor of a malignant growth.

McCarthy calls our attention to the fact that in a sarcoma of the bladder, extending submucosally, a reaction proliferation of the overlying epithelium may augment ultimate ulceration. In one of their cases the microscopic section from the periphery of the bladder wall tissue adjacent to the tumor, presented at the edges transitional epithelium; toward the center, the surfaces became denuded of epithelium and the underlying stroma was formed by an arrangement of spindle cells with long spindle shaped nuclei.

### PATHOGENESIS

The question now arises as to the pathogenesis of these mystifying tumors.

Ewing cites Borst and others to the effect that sarcoma does not develop from previously normal cells, but from embryonal cell groups. He considered that the association of carcinoma with sarcoma is teratological in origin. In several cases that he has noted, he was not satisfied that the spindle cell areas were not modified epithelium. This would be in accordance with Caulk's views, who states that there is a great selectivity of sarcomatous tumors of the bladder for the trigone and at its juncture base, which in all probability has a great deal to do with the faulty seam of fusion of the two fetal surfaces and the mesodermal origin of the trigone which is derived from the lower end of the wolffian duct, the remainder of the bladder being derived from the ectodermal cloaca. In our opinion, however, it may be possible and quite logical that aberrant mesodermal embryonal cells may be located anywhere in the bladder wall, just as aberrant embryonal cells are found in various locations of the body.

For the foregoing reasons, if we may venture an opinion on pathogenesis, we personally prefer the fourth postulate of Borst, namely, that in a case of supposed epitheliomal sarcoma of the bladder, for example, the tumor is originally a sarcoma with the overlying epithelium undergoing carcinomatous change.

### TREATMENT

The rationale of tumor management has traditionally been a perplexing problem confronting urological surgeons, and although there has been much divergence of opinion in the past, yet a review of the literature will impress one with the modern unanimity of thought and reaction on this subject. We must ever be mindful of the value of prompt diagnosis and early attack on bladder malignancies. Also the gradation, as learned from biopsy reports, will materially assist one in selecting the form of therapy to use in a given case. Roentgen-ray, fulguration, radium and total cystectomy are our most potent weapons in the treatment of bladder tumor. Cutaneous ureterostomy, intestinal ureterostomy, and resections of the bladder vault or lateral walls have been discontinued in our service, and, in many instances, patients are made infinitely more comfortable and life has thereby been prolonged. Cutaneous ureterostomy, in conjunction with fulguration and radium, has been of inestimable value in selected cases.

The literature states that in 69 patients operated upon, only 3 patients were considered cured, having been followed for a period of from 3 to 12 years.

Liberal resection of the tumor bearing bladder wall or complete cystectomy and ureteral transplantation may result in cure in an early diagnosed case. However, only about 8 such cases have been recorded in medical literature.

SUMMARY

In the foregoing case report, literary review, and pathological comments on the subject of spindle cell sarcoma, we are confronted with the question as to whether all the reported cases of spindle cell bladder tumor were true to type, also is it not logical to assume in the light of modern pathological investigation and the splendid work of The American Urological Society Tumor Registry that certain cases reported in the past might have been transitional?

Bladder tumors, not unlike malignancies in other bodily structures, continue to present an open challenge to surgeons and pathologists. The histogenesis, pathogenesis, and embryological uncertainties are gradually assuming more stable and dependable positions.

The epic making work of cancer surveys, cancer clinics, and pathological investigations are rapidly clarifying these perplexing problems, and we feel that in the not too distant future, tumor management will be greatly simplified.

The authors wish to express their due appreciation to Dr. Richard Jaffe, Dr. L. Hektoen, Dr. J. P. Simonds, and Dr. B. H. Neiman for their interest, enthusiasm, and courteous assistance.

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# CARCINOMA OF THE BREAST

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TO speculate concerning the unknown is usually an entertaining but profitless pastime. However, if one studies the conditions that seem to precede the development of a disease of unknown origin, there is always the possibility that some knowledge might be obtained which might prove to be of prophylactic value. With this thought in mind, we have reviewed the histories of 518 cases of carcinoma of the breast. This series of cases extends over a 25 year period. These histories were all taken by internes and many are incomplete, but, in none of them was there any attempt made to "fit the history" to any theory of etiology. Apart from everything else, we do not champion any theory as to the causation of carcinoma of the breast. However, this review is simply a statement concerning certain conditions of the breast which were found to exist before the diagnosis of carcinoma of the breast was made. Whether the correction of these conditions will prove of prophylactic value, time alone will determine, but, certainly the measures advocated to correct or prevent such a set of symptoms will at least be of benefit to the patient, whether they have any value in preventing the development of carcinoma or not.

Some form of "dysfunction" of the breast was found in 88 per cent of these 518 histories. This statement demands a fuller explanation of the expression of "dysfunction." For example: (a) in 48 per cent the normal breast function was never established; (b) in 38 per cent there was a distinct irregularity of lactation; (c) in 10 per cent there were histories of abscesses, definite and repeated trauma or infected nipples; (d) in 12 per cent nothing abnormal was found in the histories.

In studying groups a, b, and c, it might be interesting to review briefly some of the comparatively recent research work done concerning etiology of carcinoma of the breast. It might also be profitable to analyze, as far as possible, what occurs in the breasts of the lower animals when subjected to certain hazards which are forced on women by the so called higher civilization.

Many attempts have been made to isolate some specific bacterial organism which might cause cancer. The consensus at the present time is that cancer is not caused by any specific micro-organism.

Herring has recently published statistics to show that the incidence of carcinoma of the breast is 74.7 per hundred thousand in single women over 35 years of age, while with married women over 35 years of age, such an incidence is 41.9 per hundred thousand of population. In other words, the ratio of incidence in this age group is nearly twice as high in single women as it is in married women. In the ages below 35 years, cancer of the breast occurs so infrequently in both the single and married groups as to produce rates too low for accurate comparison. This bare fact is especially interesting at this time when so much is being published concerning the association of breast conditions and the organs of internal secretion.

Time does not permit me to discuss the various fascinating pieces of research work that have been done.

In the 246 cases in which lactation was never established, pain was found associated in the breasts a few days before each menstruation in 192, or 78 per cent. Of those 192 cases, 174 stated that the pain was most marked and the breast more definitely swollen on the side in which the carcinoma later developed. However, this information cannot be accurately estimated, for the patient naturally assumes the pain was more marked on the side in which the growth later developed.

The chemical theory of etiology of carcinoma began with the experimental work of Yamagiwa who was able to produce cancer of the ears of rabbits by repeated application of ordinary coal tar.

Block and Dreypuss found that, by distilling coal tar at very high temperature, they obtained a product which produced cancer in mice in a shorter period, and in a higher percentage of cases than did ordinary coal tar.

Kenneway isolated dibenzanthracene from coal tar and found such to be the carcinogenic agent. He further proved that, when this chemical was removed from coal tar, the coal tar did not produce cancer in mice no matter how frequently and how long it was applied. He also succeeded in producing dibenzanthracene synthetically, and such was also highly carcinogenic in mice.

Recently Lacassage has produced cancer in

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male mice by the injection of estrin. This requires many injections, over long periods of time. The most frequent site of the cancer in these mice is in the breast.

Even more recently assays of breast tumors have been made, and such seem to indicate the existence of a carcinogenic hormone. These experimental indications combined with the clinical observations seem to indicate that the ovaries contain some carcinogenic control of breast tumors.

While neither the experimental results nor the clinical associations are sufficiently definite to be certain of dependence of the formation of breast tumors on ovarian dysfunction, still these studies emphasize the importance of the proper correction of pelvic disorders with the view of preventing tumor formations in the breast.

Max Cutler advocated the giving of ovarian residue (without corpus luteum) in these cases with painful breast, and with a few of our cases, we thought the patients obtained some relief from such medication. At the present time, we rather agree with Emil Novak in not having any faith in the oral administration of glandular extracts. Also our experience with the subcutaneous injections of estrogenic substance as advocated by Whitehouse has not been such as to inspire much confidence.

While much valuable research has been done in the physiology, pathology, and chemistry of the organs of internal secretion, and especially recently concerning the interdependence of the various glands on each other, still at the present time we do not seem to have any definite therapy to relieve these breasts which are painful during and preceding menstruation, and which might be the forerunners of the future cancer.

However, we have found that the pain in many of these cases is relieved by the use of a properly fitting brassière. This pain is frequently most pronounced in the upper outer quadrant of the breast. A "pocket" brassière with a piece of elastic about 4 to 6 inches long in the strap support, with the straps crossed behind the shoulders and with an adjuster in front where it is accessible, prevents the drag of the breast. Experience has taught us that different types of brassières will be needed to elevate and support different types of breasts, the essential factor being that the breasts are not pulled to the chest wall as is now usually done.

As cancer of the breast is also found most frequently in the upper outer quadrant, it makes one give more serious consideration to the lymphatic obstructive theory of Handley as being a possible etiological factor. In this connection, it is interesting to recall the fact that malignancy of the udder of the milk cow is practically unknown. With the dairy cow, lactation is almost continuous, and the dependent position of the teats allows free and complete drainage. Drabble made a very extensive study of the udders of all cows slaughtered in the State abattoir at Homebush Bay, New South Wales, Australia, from 1926 to 1929. He does not state how many animals were killed during that period, but he was able to find only 3 cases of malignancy of the udder and all 3 of these were epitheliomas and did not involve the milk ducts.

Feldman, in his book entitled *Neoplasms of Domesticated Animals*, states he has never seen a case of carcinoma of the udder of a milk cow.

Cancer of the breast of bitches is very frequent and is perhaps due to the fact that the puppies are removed from the breast very early, probably before the mother finishes the lactation period.

Bagg was able to produce 87 per cent of mammary carcinoma in mice by removing the young from their mothers soon after birth. The incidence of mammary carcinoma in the control group was less than 5 per cent.

Cancer of the breast in Japanese women living in Hawaii, who have a large number of children, is very rare. The same condition of affairs exists in the miners' wives in West Virginia. This may be due to the fact that these women have the idea that while nursing a baby there is little danger of pregnancy, and that they continue lactation as a defensive measure.

All these factors would seem to indicate that those conditions which do produce obstruction or irritation (lymphatic or any other type) might produce cancer, especially in those patients with "constitutional tendency" to malignancy. What biologists mean by the term "constitutional tendency" is necessarily somewhat indefinite. However, there is no doubt that there is a definite association between heredity and cancer. Articles by Little and others working with high and low cancer strains of mice definitely demonstrate such an association with animals, while the study of Clara J. Lynch with twins and cancer in the human race proves without a doubt that heredity does play a very definite rôle in the causation of cancer in the human being. The following is a very clear statement quoted from a small portion of her article:

> Of special interest for this discussion is the testimony from duplicate twins. If two individuals are derived from the splitting of one fertilized egg and therefore composed of the same germ plasm, they should not only resemble each other to a marked degree in physical appearance, but should also exhibit the same susceptibility to disease, if it is true that susceptibility is an inherited character. In

TABLE I.—MODIFICATIONS

Name of Patient _____ Date _____

| | |
|---|---|
| **Age:** | |
| 40 or under | = 10 |
| 41 to 55 | = 4 |
| 55 or over | = 2 |
| **Lactation:** | |
| History of no lactation and no pain in breasts associated with menses | = 0 |
| History of no lactation but pain in breast associated with menses | = 6 |
| History of lactation and no pain in breast associated with menses | = 0 |
| History of lactation and pain in breast associated with menses | = 3 |
| Irregularities of lactation | = 6 |
| Breast lactating at time of examination | = 15 |
| **Rate of growth:** | |
| Slow (over 24 months) | = 4 |
| Moderate (12 to 18 months) | = 8 |
| Rapid (under 3 months) | = 16 |
| **Size of tumor:** | |
| Small (3 cm. or less) | = 5 |
| Large (over 3 cm.) | = 10 |
| Ulcerated | = 30 |
| **Malignant glands:** | |
| Numerous small axillary | = 12 |
| One large in axilla | = 6 |
| Under triangular ligament | = 60 |
| Supra clavicular | = 60 |
| C. I. M. Total | = _____ |

Grade A (relatively benign) C. I. M. = 11 to 35
Grade B (moderately malignant) C. I. M. = 36 to 49
Grade C (highly malignant) C. I. M. = 50 and over

_____ M.D.

C. I. M., Clinical index of malignancy.

recent reviews of the literature 38 cases have been discussed. In 12 cases, only 1 member of the pair had a tumor. But as the unaffected individual, in all but one instance, was still living when last investigated, the final report for this group cannot be given. Since some variation is to be expected the occurrence of a limited number of exceptions will not detract from the extraordinary picture afforded by the 26 remaining pairs. All had tumors; the growths of each couple were in general of the same type, in the same organ, and appeared at approximately the same time. The fact that when both twins do have tumors they present such conspicuous similarities is of a great importance. The parallel in their case histories speaks strongly in favor of genetic control.

While the work done on the association of heredity and cancer is most interesting, still I am quite sure we will not be able to establish any prophylactic measures until we give as much thought to the mating of human beings as cattlemen do to the breeding of their animals. Certainly were we able properly to mate human beings in a biological sense, such as Maud Slye has done with mice, we have every reason to believe we could "breed out" carcinoma of the breast in the human race.

We have all had experiences with cancer of the breast in pregnancy, and doubtless recall how very "wild" the malignancy developed. In 1922 I was able to collect (12), as a result of a questionnaire only 15 instances in which pregnancy was known to have occurred after removal of a breast for carcinoma. Of this number, 13, practically 87 per cent, developed carcinoma in the remaining breast, 12 of whom died very promptly. The interval period between operation and recurrences associated with pregnancy varied from 2 to 10 years.

If these observations are accurate the following practical suggestions might prevent the development of precancerous conditions of the breasts:

1. More careful history taking with an accurate analysis of the history. Deductions made from these histories will often also aid in determining whether to treat the case as benign or whether to handle it as a possible precancerous lesion.

2. Education of mothers as to the necessity of nursing their babies for at least 6 months or until the breast has been relieved of all products of lactation and stagnation.

3. If for any real reason the mothers are not able to nurse their babies, insistence on the use of a breast pump (preferably an electrical one) until the breasts have been drained of all signs of retention of any of the products of lactation.

4. More careful attention to the care of the nipples.

5. Correction of pelvic disorders especially when there is any pain in either breast during the menstrual periods.

6. More consideration to the proper support of the breast at all times.

7. Instruction of young mothers not to become pregnant again after having had an operation for cancer of the breast.

In visiting various hospitals I have been much impressed with the difference in the attitude of the pathologists and the surgeons as regards the prognostic value of the histological study of tissue. Many pathologists apparently feel that there are too many uncertain and uncontrollable factors entering into such a study to give as much weight to its prognostic worth as do most surgeons. Some of these factors are:

1. The individual equation of the various pathologists in differentiating cells. This was demonstrated by Bloodgood who sent the same set of slides to a number of well known patholo-

gists and received in reply many different estimates of the same tissue.

2. The site from which the specimen is removed, for certainly the histological picture changes the farther from the active cancer the specimen has been taken.

3. The uncertain response of cancer cells to irradiation. Frequently it looks as if the more active and immature cancer cells regress more quickly than do the more stable and mature cancer cells when exposed to proper irradiation.

In 1928 Lee and Stubenbord published a clinical index of malignancy for carcinoma of the breast, and since this time we have been using a modification of it and found it of great value. Lee and Stubenbord followed for 5 years 100 cases of carcinoma of the breast which had been classified by their clinical index, and Ewing made groups of grades based on the histological index of the same 100 cases. The clinical grading was found to be more reliable than grading by the microscope. However, we continue to employ the histological "grading" of pathological specimens and feel both methods should be used jointly. In Table I are shown the modifications.

Carcinoma of the breast does not differ from any other disease in the fact that every case should be studied as an individual case and be given the benefit of such an analysis. However, there are certain general principles around which all treatment revolves. To be more specific, we feel that surgery, with the addition of intelligently given irradiation, is the basis of the proper treatment of carcinoma of the breast.

Routine x-ray examinations of the chest, pelvis, and long bones are made in all cases of carcinoma of the breast. During the last 100 cases we have found metastases in 2 cases in which there was no pain and nothing else to suggest the existence of such a condition. There were 3 other additional cases in this same series of 100 cases in which pain (usually thought to be "rheumatic") indicated that metastases might be found on x-ray examination, and such were demonstrated to be present.

Pre-operative irradiation is probably the most important contribution of radiologists to the treatment of cancer of the breast and is now generally regarded as being of even more importance than postoperative treatment.

There is one great danger in giving pre-operative irradiation that is not usually mentioned when the treatment of cancer of the breast is considered. With many of these cases, there is so much improvement in 4 to 6 weeks after exposure to the x-ray that the patients do not come back to the hospital for the necessary surgery until the growth has begun to increase again. This situation is somewhat comparable to that existing in the case of hyperthyroidism and the preparation with iodine of the patient for a safer partial thyroidectomy. For some reason, we do not seem to be able to exercise this proper control over many of our patients. As a result of this, we try to make an accurate estimate of the patient's mental ability and willingness to co-operate. If there is any question in our minds that the patient is mentally unable or unwilling for any other reason to carry out directions intelligently, then we advise immediate operation without pre-operative irradiation. The present tendency is toward the more frequent employment of extensive pre-operative irradiation by the Coutard method with a high voltage machine.

Occasionally, in very bad surgical risks in extremely old patients, we do only an amputation of the breast and give both pre-operative and postoperative irradiation. However, such a practice is very rarely justifiable.

We feel very strongly that a radical removal of the entire breast, the muscles, axillary contents, etc., should be done in one dissection, from the periphery toward the center; in other words, a complete Halsted type of operation. We employ an extra fine silk for the ties, and with such ligatures only very small amounts of tissue, if any besides the actual vessel wall, are tied. We wash out the entire operative field with hot saline—hot enough for the hand to stand the heat, but not so hot as to burn the skin. This not only washes out any clots of blood that might be present, but, it is possible that the hot water may kill any immature cancer cells which may have escaped into the field of operation. The heat also has some hemostatic value as far as the extremely minute vessels are concerned; sometimes these vessels are the cause of postoperative collections of serum.

The skin incisions are made wide of the growth and no thought is given to the closure of the wound at the time of making these incisions. It has been suggested that the surgeon who makes the incision for removal of a cancer of the breast should not be the one to close the field of operation; then he does not have the temptation to get a little closer to the malignancy in order to make closure of the operative field easier.

Thiersch grafts taken from the thigh are easily obtained and usually successful.

A small stab incision is made in the mid-axillary line. Through the opening is placed a tube containing 50 milligrams of radium and a

light weight rubber drain. The drain is placed between the axillary vessels and the radium. In addition to the radium which is placed in the axilla, another 50 milligrams of radium are distributed in the area supplied by the internal mammary vessels and lymphatics. Four 12½ milligram radium needles are placed in a rubber tube which is about 12 to 15 inches long. A string is tied around the rubber tube in between the needles of radium. In this manner, the radium is distributed equally throughout the length of the tube. This tube is then placed under the skin and the long end is brought out through the lower end of the incision, while the length of the tube occupies the area normally supplied by the lymphatics, which accompany the internal mammary vessels. We have never been able to detect how this radium in any way seems to interfere with the healing of the incision or the "taking" and development of the skin grafts.

The skin over the chest and axilla is held firmly against the chest wall with the aid of a large sea sponge and is held in place by adhesive straps. The arm is left free and the patient is made to use it as soon as she is conscious.

Less than 1 per cent of our cases have had swollen arms which have given any serious trouble. We feel that the swelling of the arm when it occurs is due to a low grade infection in the axilla, preventing the regeneration of the lymphatics. This point was demonstrated beautifully in animals by Reichert.

Postoperative irradiation will produce slight bronzing of the skin. This is accentuated at the portions of the flap where radium has been implanted, where there is frequently marked reddening with peeling.

Irradiation of the ovaries in young women to produce an artificial menopause should be done in every case in which the patient is still menstruating. Our attention was first called to this by Dr. C. H. Peterson. He was giving irradiation to a pelvic metastases for the relief of pain in a case of carcinoma of the breast. After several weeks of treatment of the pelvis by irradiation, the primary inoperable carcinoma of the breast decreased markedly in size. The patient died of carcinomatosis, but this experience made us think of the possible association between an ovarian hormone and malignancy of the breast.

A visit to the Memorial Hospital in New York will convince anyone of some relationship between the ovaries and cancer of the breast. There they have roentgenograms of 2 cases with what they thought were metastases in the lung. After irradiation of the pelvis the lung shadows disappeared. Of course, no one can be certain that the lung findings were metastatic malignancies.

Herrell, of the Mayo Clinic, studied the relative incidence of oophorectomy with and without carcinoma of the breast. He reviewed approximately 3500 cases. He found "the incidence of complete oophorectomy or castration was approximately ten times as great among the non-cancer bearing females as in the group of women who developed carcinoma of the breast after oophorectomy or castration." In other words, cancer of the breast occurs ten times more frequently in the normal woman than it does in women who have had the ovaries removed.

Our experience with the irradiation of metastases has been briefly as follows: There has been no "cure" in any case. However, the pain of the metastases has been relieved in the vast majority of cases. We have no way to make an accurate estimate as regards the rate of growth of these metastases in comparison with those patients with metastases who have not had irradiation. However, such patients certainly are made more comfortable by the employment of irradiation even if the rate of growth is not slower.

We feel that irradiation combined with radical surgery is indicated in practically every case and base this opinion on a study of our results.

Up to 1920 the percentage of 5 year (or over) "cures" was 22 per cent and during this period only radical surgery was employed.

From 1920 to 1924 radium was added to radical surgery, and in this group the percentage of 5 year (or over) "cures" was 30 per cent.

From 1924 to date with the employment of pre-operative and postoperative x-ray treatment with a high voltage machine, in addition to the radium and radical surgery, our percentage of 5 year (or over) "cures" is 55 per cent.

These percentages include all the patients, both operable and inoperable, admitted to the Jefferson Hospital during this 25 year period.

By the term "cure" we do not mean to imply that we ever consider any case of cancer of the breast as absolutely cured, but, used the period of 5 years for comparison purposes.

Of course, cancer education has also been a big factor in this improvement of the percentage of so called "cures," but, it is impossible to estimate accurately this factor. However, I am certain we are still seeing far too many cases of well advanced carcinoma. In fact, the interval between the time when the patient first noticed the "lump in the breast" and the time she comes for operation has remained about the same—the average being about 6 months.

No one will deny that intelligently administered irradiation cures superficial malignancies, therefore, it is logical to assume that such irradiation should help to prevent recurrences after operations for carcinoma of the breast. In fact, there has been only one local recurrence following the last 117 operations. Before the employment of irradiation in association with surgery the percentage of local recurrences was slightly over 5 per cent. To my mind, this alone would justify the employment of intelligently administered irradiation in association with radical surgery.

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# KELOIDS FOLLOWING LAPAROTOMY

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THE simplest term in which a *keloid* may be defined is "a tumor-like fibrinous outgrowth, usually occurring at the site of a scar" (Gould). It may occur in any part of the skin surface as the result of either accidental or surgical traumatism. We are concerned in this short essay only with its presence in laparotomy wounds, where to the writer its occurrence seems unnecessarily frequent. The principles involved, of course, apply to incised wounds in any of the skin areas.

The normal healing of an incised wound is promoted by: first, cleanliness; second, the control of active bleeding; third, careful apposition; fourth, and by no means least, the prevention of undue wound tension until its tensile strength equals that of the surrounding tissues.

Absolute asepsis of the skin is an impossible achievement without tissue destruction. Indeed, so says Carrel, a few microbes are necessary to excite sufficient local reaction to inaugurate the healing process.[1]

This process comprehends, after the foregoing dicta have been observed: first, the gluing together of the adjacent surfaces by a thin layer of coagulum containing fibrin and red and white blood cells; second, the production of fibroblasts through mitosis of the connective tissue cells; third, the creation of a new blood supply through the formation of capillary buds; fourth, the intermingling of the fibroblasts of the opposing sides, creating collagen fibrils with resulting permanent union; and, fifth, the final covering of the wound, if approximation is not perfect, with epithelial cells (Christopher).

If the healing is ideal, there will be noticeable only a linear, almost imperceptible scar—a white, fine line containing ultimately an irreducible minimum of fibrous tissue. If the incision lies in the proper direction of the skin tension, there is less danger of the skin spreading than when it is made in an opposed direction. Unfortunately, a vertical incision in the mid-abdomen, in so far as the skin wound is concerned, does not conform to this requirement.

If the phase of fibroplasia, because of interfering factors, is developed beyond the requirements of normal healing, a keloid may develop. In the healing of wounds by second and third intention, the formation of granulation tissue is necessary for epithelization. In keloids following burns the disfiguration is sometimes enormous, especially when located on or about the face.

Pathologically then, a keloid consists of a mass of cicatricial fibroconnective tissue, composed of coarse hyalinized collagen fibers without elastica (McFarland). It has no capsule and fades into the surrounding connective tissue. In whites, its color is pinkish red; in negroes, in whom it occurs oftener, somewhat darker than the surrounding skin. As time goes on it sometimes disappears spontaneously. Malignant degeneration is a possibility as in all adventitious growths where either prenatal or postnatal embryonic cells predominate, a theory especially stressed years ago by Conheim, and which has never been entirely disproved.

The abdomen is made up, from without inward, of skin, superficial and deep fascia, muscle, subperitoneal fascia, and peritoneum. In the exact midline separating the recti, no muscle tissue is exposed in making a vertical incision. But the several layers vary greatly in the time required for healing after coaptation. Thus the peritoneum, a serous membrane, heals very quickly and fortunately so, for should infection occur, the abdominal cavity is thereby protected. Muscle cells, on the other hand, take no part in the process of repair—only the muscle sheaths. Skin and mucous membranes heal quickly because epithelium has a marked power for regeneration (Christopher). It is a broad surgical principle in closing all wounds that, whenever possible, like tissues should, in suturing, be made to assume their original relationship.

We have no cross section of our surgical records showing the frequency of abdominal wound infection or the frequency of keloids. Unfortunately, most hospitals during our surgical career kept no such records, and we are making no attempt to evaluate our statistics in their entirety. But our private records, covering several thousand cases, in each instance tell the exact method of wound closure, so that years later, when opportunity affords, one can make fairly reliable comparisons.

May we say, in passing, that at the time of our graduation in medicine, Pasteur's epochal discovery and Lister's early observations, although made several years before that event, the germ

[1] Man, The Unknown. By Alexis Carrel, p. 201.

theory of disease was just beginning to be seriously discussed, and with no small degree of acrimony. Our records, therefore, cover more than 50 years of a fairly active abdominal surgeon who has experimented with many and various techniques in making and closing abdominal wounds.

Wound infections, cicatrices of all forms, and postoperative hernias are much less frequent now than formerly—thanks to the evolution of a more ideal technique. But keloids, it seems to the writer, still occur all too often. Because of the fact that, when present in an abdominal scar, they are less conspicuous than when present in exposed areas, their importance has been underestimated.

Our observations, then, lead us to the following conclusions:

1. A blood clot within a flesh wound, while at times serving a very useful purpose in the healing of fractures, often leads to wound infection.

2. Too great an effort to control all blood oozing by pressure clips frequently leads to tissue necrosis with resulting infection.

3. The overloading of the wound with catgut, especially when the body resistance is below par, because of age or otherwise, portends danger. The finest strands, compatible with safety, should be used and as few knots as possible left behind for nature to absorb.

4. Postoperative oozing can be prevented by reinforcing the opposing surfaces with tension sutures, preferably silkworm gut. These sutures also overcome, during the first few days of healing, all skin tension.

5. The bringing together, in closing the skin, of a wider area of raw surface than is afforded by edge-to-edge approximation only, is accomplished by means of Michel clamps. For years before these clamps were introduced, we attained the same objective by means of interrupted mattress sutures, introduced not less than 3 millimeters from the wound edges. This same principle, before the Watkins's technique was evolved, we utilized for a number of years in cystocele and prolapse operations.[1]

6. Relieving the skin wound from all lateral tension, with butterfly adhesives, for at least 3 weeks after the patient leaves the hospital, we consider the most important step of the entire technique. It sums up the especial object of this brief thesis. Nature, wonderfully kind when not handicapped, cannot in the brief interval of 5 or 10 days complete her method of welding together the skin edges so securely that they will remain in close contact indefinitely—hence the wide and unsightly scars which in time all too often develop. From the standpoint of artistry, it is not the *immediate* appearance of the wound that matters so much as its final appearance after 1 or 10 years have elapsed.

We began the practice of abdominal surgery when dependence was placed upon "through-and-through" interrupted silk sutures only. Those were the good old days of postoperative hernias and cicatrices. The sutures were left *in situ* for 10 days and after their removal, if the abdomen happened to "blow up" with gas, the wound separated allowing the intestines to escape. Later, silkworm gut, silver wire, and catgut displaced the inadequately prepared silk, and the results were better but far from perfect. For years we used the subcuticular skin stitch (silk, silver wire, silkworm, or catgut) with ideal *immediate* results, but with most discouraging *mediate* results. Wounds thus treated, when the dressings were first removed, won the admiration of one's students. But in the patients who have returned to us after several months or years, a larger percentage of keloids has followed in the train of the subcuticular stitch than when interrupted stitches alone were used. Why this is so we do not attempt to explain. Possibly the projecting suture ends favored the entrance of micro-organisms into the wound; or the suture, because of close proximity to the wound edges, interfered with nature's delicate mechanism of healing by first intention. We are especially emphasizing this fact for the reason that the subcuticular *mattress* suture in skin approximation is now quite commonly used and keloids are showing up with corresponding frequency. The surgeon should then, in closing the abdominal wound, keep in mind the fundamentals which we have attempted to summarize. The writer's sole object in reviewing them is to lessen the number of keloids which are still all too frequent. It is to be regretted that no known method of wound closure up to the present time is 100 per cent perfect. But a more thorough knowledge of nature's processes, encouraging rather than antagonizing them, will carry us far in the prevention of unsightly scars. At least this has been our experience.

### TECHNIQUE AND SUMMARY

Our conclusions can best be epitomized by summarizing the procedure which we follow:

1. General or spinal anesthesia is used. Local

[1]See the writer's contribution to Howard A. Kelly's *Stero-Clinic*, Section 23, on *Prolapse of the Uterus;* also A new operation for cystocele. Am. J. Obst., 1905, 1: No. 2.

anesthesia, especially when used in excess, has a tendency to devitalize the tissues.[1]

2. Careful asepsis is never, no matter how rigidly observed, 100 per cent perfect; therefore, the skin incision is made with scalpel number one. Scalpel number two is used to divide the underlying structures. All active bleeding is controlled but moderate oozing is ignored.

3. The operation completed, the peritoneum is brought together with a fine, plain gut suture.

4. Three to 5 silkworm tension sutures are introduced from within outward, the same needle never being used twice during the operation. Exit of the needles is at least 2 centimeters from the wound edges. The sutures should include, other than the layers of fascia and the recti, the ridge of tissue resulting from the closure of the peritoneum, so that, when they are finally tied, there will be no dead space between the peritoneum and the intervening fascia. These sutures are left untied until the skin clamps are applied.

5. The deep fascia, either edge to edge or overlapping, is carefully sutured with chromic gut No. 1 or 2, as few knots as possible being left.

6. The skin wound is closed with Michel clamps, so placed as to make it possible to remove them with minimum trauma to the healing skin wound behind. Before the last one or two clamps are applied, pressure is made from below upward with a gauze sponge for the purpose of expressing any accumulated blood or serum from the wound.

[1]This the writer has stressed in his book, *Clinical Gynecology*, p. 211, giving his statistical findings.

7. The interrupted sutures are tied over narrow strips of gauze, saturated in 95 per cent alcohol, placed on either side of the clamps, just tightly enough to control all oozing. Unless the clamps are thus protected, unnecessary suffering ensues, both from the tension sutures and from direct pressure upon the clamps, when the outer dressings and binder are applied. The alcohol serves a most useful purpose as a destroyer of germs.

8. The tension sutures are removed not earlier than the fourth day and the clamps not earlier than the fifth day following the operation. *After their removal, the skin wound is sustained for at least 3 weeks by the application of butterfly adhesives, the wound being protected by an underlying strip of sterile gauze. Adhesive plaster should never come in direct contact with the skin wound, even though its center is smeared with an antiseptic, for at least 10 days following the operation. It cannot be made absolutely sterile and, when so placed, frequently results in slight skin infection, which is often the forerunner of a keloid.*

This summary is deduced not, as we have emphasized, from accurate statistical data, which would be quite impossible to obtain from the case records of any consulting surgeon whose clientele is scattered far and wide; but rather from such cases as have subsequently returned to us for re-examination, or for newly developed symptoms. During the last 15 years, we have especially stressed for our internes the closing italicized paragraph with correspondingly better results.

# EARLY WEIGHT BEARING IN FRACTURE DISLOCATION OF ANKLE JOINT

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THREE important objectives involved in the treatment of fracture dislocation of the ankle joint are: (1) the fracture must be so reduced that complete anatomical position of the fragments be restored; (2) this reduction must be maintained throughout the period of healing; (3) the function of the extremity must be restored in the shortest possible time.

*1. Reduction of the fracture.* Failure to obtain a complete anatomical reduction will result in arthritic changes about the ankle joint which will cause considerable disability in later life. Although a perfect reduction may not be necessary to obtain a good functional result in fractures about other joints, a perfect reduction is necessary in fractures about the ankle. Slight widening of the malleoli, or displacement of the astragalus, wherein the weight bearing is not distributed to the center of the lower articular surface of the tibia, will cause erosion of the adjacent articular cartilage, with varying degrees of arthritis and ankylosis.

More important than the malleolar fractures occurring about the ankle is the accompanying dislocation or subluxation. Trethowan stresses the point, in discussing this injury, that it is better to consider it primarily as a dislocation of the ankle joint than as fractures of the malleoli. The word "fractures," he states, clouds the issue by stressing the less important feature. He prefers the term "dislocation-fracture" to the term "fracture-dislocation." The misplaced joint, not the broken bone, is the main cause of the discord and excessive friction in the working parts.

Accordingly, the reduction of this injury should be instituted as early as possible. The main objective is to reconstruct the joint so completely that weight bearing surfaces are in perfect apposition. In the majority of cases, whether the dislocation is lateral or posterior, partial or complete, such reduction can be easily accomplished, if performed immediately after the injury is sustained. On the other hand, the waiting of several days or hours may make such reduction impossible, and may necessitate open operation.

Local anesthesia should be used, and the reduction should be performed according to the method advocated by Boehler. About 20 cubic centimeters of 2 per cent novocain should be injected into the fractured portions of the tibia and fibula and into the ankle joint. The surgeon, seated on a low stool, supports the injured foot on his knee. Pressure is applied over both malleoli to dispel the effused blood. The flexed knee relaxes the pull of the gastrocnemius. Reduction is then accomplished, depending on whether the dislocation be lateral or posterior. The heel is held in the midline, the forefoot in mid-position (not in supination).

Boehler emphasizes the fact that the foot should be placed at right angles to the leg, or in slight degree of plantar flexion. He cautions against dorsiflexing the foot, because the front part of the astragalus (which is wider than the back) is forced between the malleoli, and tends to separate them.

*2. Maintenance of reduction.* With the methods commonly used, namely, the application of a circular plaster bandage over various thicknesses of sheet wadding, there is a tendency usually for the foot to become displaced. After the swelling subsides, a certain amount of laxity results. The foot is not held firmly fixed in the plaster, and the muscle pull that is permitted will often cause a displacement. Dickson, in discussing posterior marginal fractures of the tibia, applies a plaster cast extending above the knee, which is held in moderate flexion to avoid a possible recurrence of the posterior dislocation and displacement of the marginal fragment. After 2 weeks, the portion above the knee is removed. A number of surgeons advocate an open operation and fixation of the fragments with wires. Dieterle describes 2 cases in which he used wires, 1 with an open and the other with a closed reduction, and he advocates such method of procedure in marginal fractures.

In the type of cases presented, I have found these procedures to be unnecessary, provided one uses a properly applied non-padded plaster such as advocated and described by Boehler. After the fracture is reduced, a plaster splint is placed directly over the skin on the lateral aspect of the leg and foot, in stirrup fashion. This is incorporated in a flannel bandage, and a second splint

From the Service of Dr. S. Kleinberg, Hospital for Joint Disease.

Fig. 1 Fig. 2 Fig. 3

Fig. 1. Case 1. Posterior dislocation of the ankle with fractures of shaft of fibula, lateral malleolus, and posterior margin of the tibia.

Fig. 2. Immediately after reduction. The ankle has been immobilized in a well fitting non-padded plaster cast.

Fig. 3. On removal of the plaster 10 weeks after injury. Position of fragments maintained in spite of weight bearing. Note absence of osteoporosis.

is fixed over the posterior aspect of the leg and sole of the foot. Two or three circular plaster bandages are applied. Firm pressure is maintained over both malleoli while the plaster is hardening. Without sheet wadding and with the plaster adhering to the hairs of the skin, no motion is permitted at the ankle. The plaster should be used merely as a retentive bandage; never as a corrective one.

If the reduction, as checked up by postoperative roentgenograms, is satisfactory, not only will this plaster hold the fragments in position, but also early weight bearing may be permitted without fear of subsequent displacement of the fragments.

3. *Restoration of function.* The average duration of disability, in those cases in which no weight bearing is allowed, is about 6 months or longer. Dickson, in his article referred to, does not permit weight bearing before 8 weeks. Trethowan likewise cautions against weight bearing before 6 or 8 weeks. The fear, of course, is that of displacement of the foot. Without weight bearing, atrophy of the muscles and osteoporosis of the bones of the leg and foot result. The ankle becomes stiff. Weight bearing is now a painful procedure; and several weeks of active physiotherapy follow before the patient is able to bear weight without discomfort. The patient uses his crutches not only while the plaster is on, but also for many weeks after the plaster is removed. Then weight bearing without support is a cautious, tedious procedure until the muscles become active, the ankle joint mobilized, and the bones regain their normal texture.

In the cases presented, a walking iron is incorporated in the plaster and, after a few days, the patient is permitted out of bed. When

Fig. 4 Fig. 5 Fig. 6

Fig. 4. Case 2. Tri-malleolar fractures of the ankle with lateral dislocation of the foot.

Fig. 5. Complete reduction of the fractures and dislocation. A non-padded plaster-of-Paris cast has been applied.

Fig. 6. After removal of the plaster, 7 weeks later. Firm callus, no displacement of fragments, no osteoporosis.

Fig. 7, left. Case 3. Posterior marginal fracture of the tibia with posterior dislocation of the astragalus.
Fig. 8. Nine weeks after reduction and early weight bearing. Healing with maintenance of reduction.

crutches are permitted, the patient learns to depend on the crutches for support and can be encouraged to discard them only with difficulty. When a cane is used, the majority of patients can learn to walk without any difficulty after a week. Many can get along even without the cane. The plaster is maintained for 8 to 10 weeks, depending on the severity of the injury. During this time, they are actively using their muscles. The circulation of the extremity is maintained; the swelling of the toes disappears quickly; bone atrophy from disuse cannot result. On removal of the plaster a fairly good range of motion at the ankle joint is found in most cases. The calf muscles of the affected leg are only slightly weaker than those of the other leg. Roentgenogram will show no osteoporosis; the patient can immediately bear weight on the foot without pain. Usually, 2 or 3 weeks of physiotherapy are required to mobilize the ankle joint completely. The average duration of disability is 10 to 12 weeks usually. To prevent the swelling that occurs after removal of the plaster, Boehler uses an Unna paste boot. I have found a flannel bandage (applied after the leg and foot have been well painted with mastisol solution) or an elastoplast bandage to be just as effective. Massage and prolonged physiotherapy are not indicated when subsequent swelling is prevented.

Case 1. Female, aged 27 years, sustained an injury to the right ankle in April, 1933. She was 8 months' pregnant at the time, and weighed about 25 to 30 pounds over her usual weight. Roentgenograms (Fig. 1), showed a complete posterior dislocation of the foot, with fractures of the internal malleolus of the tibia, posterior margin of the tibia and shaft of the fibula. Reduction was performed the same day under local anesthesia, and a non-padded plaster boot was applied. Postoperative roentgenograms (Fig. 2) showed complete reduction. The patient was out of bed within a week, and, because of the pregnancy, was permitted to use crutches. She was delivered 1 month after the accident, and remained in bed for 2 weeks. Then weight bearing was cautious; crutches were discarded 1 week later. Because of the non-weight bearing period, the plaster was maintained for 10 weeks. Roentgenograms, taken after removal of the plaster (Fig. 3), showed the reduction had been maintained throughout the period of weight bearing; good union had resulted. About 20 degrees of plantar, and 20 degrees dorsiflexion, were present at the ankle joint, and a fair range of lateral motion. To prevent subsequent edema of the extremity, an elastoplast bandage was applied for 2 weeks. At the end of 3½ months from the day of injury, a complete range of painless motion was obtained.

Fig. 9

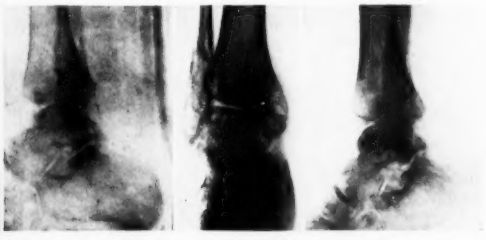

Fig. 10



Fig. 11

Fig. 9. Case 4. Pott's fracture with lateral subluxation of the foot.
Fig. 10. Reduced and immobilized in a non-padded plaster.

Fig. 11. Nine weeks after reduction. No weight bearing. Note the osteoporotic changes in bones of the foot which are present.

CASE 2. Female, aged 65 years, fell and injured her left ankle. Roentgenograms (Fig. 4) showed a lateral dislocation of the ankle, with fractures of the fibula, internal malleolus and posterior margin of the tibia. Reduction under local anesthesia was performed on the same day; a non-padded plaster was applied. Postoperative roentgenograms (Fig. 5) showed complete reduction of the dislocation with the fractured fragments in satisfactory alinement. Despite her age and the extent of the injury, the patient was permitted out of bed at the end of 1 week. For the first few days, she learned to bear weight on the walking iron incorporated in the plaster. No crutches were permitted, the patient learning to rely on a cane for support. At the end of 3 weeks she was able to walk around the house without much difficulty. The plaster was maintained for 7 weeks and, on removal, roentgenograms (Fig. 6) showed that reduction had been maintained in spite of early weight bearing, with good callus formation and little, if any, osteoporotic changes in the bone. She required 4 weeks of physiotherapy. The total duration of disability was less than 3 months.

CASE 3. Female, aged 55 years, sustained injury to right ankle on February 25, 1933. Roentgenograms (Fig. 7) showed a posterior marginal fracture of the tibia, with posterior dislocation of the foot, similar to the cases described by Dickson. Although, from an x-ray standpoint, reduction would appear less difficult than in the cases cited previously it was more difficult actually. The astragalus was impinged in back of the tibia; reduction was accomplished with a great deal of difficulty. It was necessary to place a flannel bandage in back of the heel, and to use a considerable amount of force to effect reduction. Local anesthesia was used. Following immobilization in a skin tight plaster, postoperative roentgenograms showed an excellent reduction. The walking iron was applied; weight bearing, without crutches, was begun in a week. At the end of 3 weeks, the patient was able to walk more than a block at a time. Roentgenograms were taken during this walking interval, to check up the position of the fragments. On removal of the plaster on May 1, about 9 weeks later, a good solid bony union was obtained (Fig. 8). No bone atrophy was found; no pain when weight was borne. Full active function was restored in 3 to 4 weeks. The total disability was about three months.

CASE 4. This case is presented to show the effect of non-weight bearing on the duration of disability. The patient, a female, aged 35 years, injured her right ankle on February 7, 1936. Roentgenograms (Fig. 9) showed a simple Pott's fracture, with a lateral subluxation of the astragalus and fractures of the malleoli. Reduction (Fig. 10) presented no difficulty; and the usual skin tight plaster and walking iron were applied. The patient lived out of town, and, hence, careful instruction was given as to early weight bearing. Crutches were prohibited. She returned on April 11, about 9 weeks after injury; she walked with aid of crutches, but was unable to bear full weight on the extremity. She had failed to follow the advice given because her friends had persuaded her that crutches were necessary and that she had misunderstood instructions. On removal of the plaster, roentgenograms (Fig. 11) showed osteoporosis, with mottling of the bones of the foot and about the ankle. Pressure on the foot was sensitive and painful, and she was unable to bear weight on the foot. Motions at the ankle were restricted and painful. She received the usual baking and massage, but because of pain was unable to discard her crutches for 4 weeks; after which a cane was used for support for 2 months, making the duration of total disability and active treatment run for a total of 5 months.

## SUMMARY AND CONCLUSIONS

1. Three different types of fracture dislocation of the ankle are presented, wherein immobilization in a non-padded plaster was followed by early weight bearing.

2. When properly applied, the plaster will maintain the reduction throughout the weight-bearing period.

3. Weight bearing stimulates callus formation; prevents osteoporosis of the bones.

4. Constant use of the muscles prevents atrophy, and stiffening of the ankle joint.

5. The period of total disability is considerably reduced.

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# METHOD OF INTESTINAL ANASTOMOSIS WITH A NEW CLAMP

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IT may be said of the making of clamps to aid in intestinal anastomosis, as of the making of books, that there is no end. Many of the men especially interested in intestinal surgery have devised, adapted, or modified some appliance for gut anastomosis, but the writer had always supposed himself immune to this general weakness. Pride goeth before a fall. The instrument herewith presented has proved useful for end-to-end, end-to-side, and side-to-side types of operations, in an ample experience, and it is hoped that others may find it worth trying.

The clamp is used in a so called aseptic type of suturing, the general principles of which have been developed in the Parker-Kerr and various other procedures. It acts to close the lumen of the gut during the placing of the sutures, and is withdrawn before the final tying of the sutures. In this form of anastomosis, it is important that the blades be as narrow as possible, so that very little bowel wall will be inverted, otherwise the inverted wall may act as a flange or diaphragm and encroach seriously on the lumen. A number of men use ordinary clamps with the blades ground narrow for this purpose. In some cases such clamps, because the compressive force acts through the hinge and the blades are long and narrow, tend to slip off the gut, or the tips gap apart a little or slip sideways on each other. It was principally to correct this weakness that the clamp herewith described was devised. It has other advantages also and these will be mentioned later.

The clamp consists of two pieces, the hinged jaws and the compressing handle. The jaws are long, narrow, and serrated longitudinally. Close to the outer surface of each jaw tip, a square pyramidal hole is sunk to receive the squared pyramidal points of the compressing handle. The handle is made like any other clamp of the hemostat type operated with finger rings and a ratchet catch, but its blades are bowed like ice-tongs and the tip of each blade ends in a squared point to be fitted into the sockets in the tips of the hinged jaw piece. The illustrations make this clearer than a lengthy description and also give dimensions. The latter, of course, may be altered for various purposes.

The technique, for instance of end-to-end suture, is as follows: The gut is crushed across at the desired levels by crushing clamps leaving a groove. The hinged jaw piece of the clamp herewith described is placed across the gut at the crushed groove and solidly locked in place by setting the handle-piece firmly into the sockets in the tips of the jaw piece. The portion of gut to be removed is cut away with the cautery close against the anastomosis clamp. The same process is applied to the other end of the gut to be resected, and the ends to be anastomosed, held firmly by the special clamps, are brought closely together, end to end. A continuous suture of median silk unites the gut walls of each end behind the clamps, which are rotated slightly away from each other during the placing of the suture.

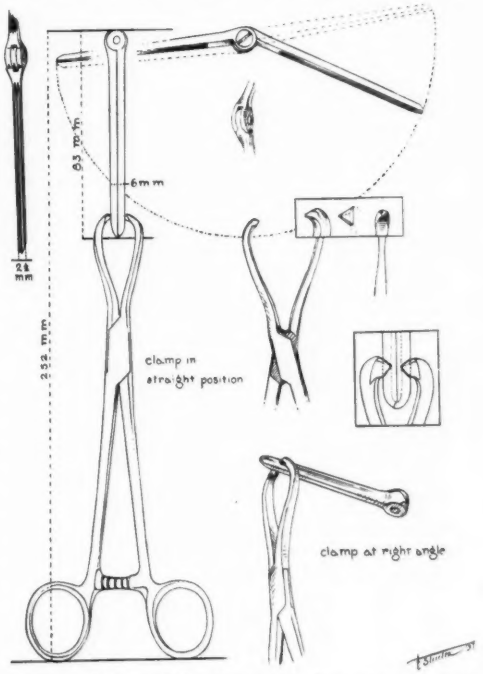


Fig. 1. Details of the clamp, with dimensions and positions.

Fig. 2.

Fig. 3.

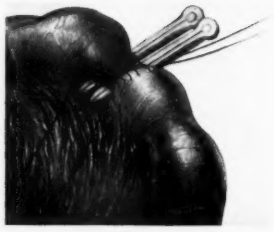

Fig. 4.

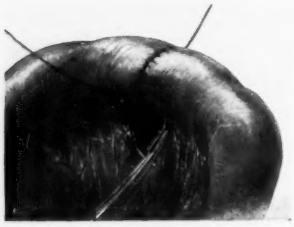

Fig. 5.

Fig. 2. Manner of placing clamps on bowel before resection of gut.
Fig. 3. Gut resected. Ends to be anastomosed brought side by side. Posterior continuous suture being placed behind clamps. Fixation handles omitted from sketch for simplicity. The two ends of this suture are to be tied.
Fig. 4. Anterior suture being placed over clamp blades. Handles omitted for simplicity.
Fig. 5. Clamps withdrawn. Anterior suture pulled snug, closing anastomosis. Ends of anterior and posterior sutures tied together.

The ends of this posterior suture are tied. Now the clamps are rotated toward each other and a similar suture unites the gut walls in front of the clamps, but in this suture the ends are not tied but left loose so that the stitch may be drawn taut after the clamps are removed. The compressing handles are now released from the tip of the hinged jaws and set on the hinged joint end instead. By gentle pulling the jaws are withdrawn from between the rows of sutures, front and back, the front row being pulled taut as the jaws of the clamps are slipped out. The corresponding ends of the front and back sutures are tied together and the anastomosis is accomplished. It can be further supported by an additional row of mattress or continuous sutures if so desired.

The squared holes and points of the jaw and handle pieces permit the assembled clamp to take three forms. Jaw and handle may be set together in the same long axis so that they form a straight line with each other, or they may be clamped together with the handle and blade at right angles to each other, the angle being directed either to the right or left of the surgeon as he may elect. In certain positions this has considerable advantage. For instance, several anterior resections of growths rather low in the sigmoid have been done with these clamps. The clamps on the stump of gut are put on with jaws and handle at right angles to each other, which permits manipulation in the confined space of the pelvis that would be impossible without this feature.

In summary, the clamp possesses firmness and security for use in the "aseptic" type of anastomosis by applying compressive power to the tips of the blades, and also has adaptability because it may be employed as a straight or right angle clamp.

# TWO STAGE LOBECTOMY IN THE POOR RISK PATIENT WITH THYROTOXICOSIS

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PREVIOUS to the introduction of iodine as a specific preparatory measure in surgery of the thyroid gland, multiple-stage operations such as polar ligation, and, less frequently, lobectomy in two stages were a necessary and frequent procedure. Since the specificity of iodine in the preparation of the usual thyrotoxic patient has been so universally accepted, the use of multiple stage operations has greatly decreased. However, there has been perhaps a failure of appreciation of the fact that while iodine adequately prepares the large majority of thyrotoxic patients, there is still a constant group of patients whose reaction to iodine is inadequate to prepare them for the complete operation, and as a consequence the mortality is sufficiently high to cause one to realize that this is not the procedure of choice. In a large charity service, such as is seen in the Cook County Hospital, in which intensely toxic, neglected, or overiodinized patients are perhaps more frequently seen than in the usual better class groups, we have been faced with the necessity of developing a procedure that would suit the patient, rather than of subjecting the patient to a standardized procedure.

Our earlier efforts in this direction practically were confined to one of the various types of polar ligation. From that experience we cannot agree with the advocates of this operation that such a procedure is followed by constant improvement sufficiently great to warrant it as a step in surgical therapy.

Polar ligation presupposes the vascular supply to and from the thyroid gland to be partially or completely reduced by that procedure. However, anatomically the vascular supply from the superior thyroid artery anastomoses freely with the inferior and superior thyroid vessels of the other side, and, in addition, the arteria thyreoidea ima, even though inconstant, may arise either from the innominate or from the aortic arch, or may coexist with the inferior thyroid artery or even replace it. Further vascular supply comes also from the prethyroid muscles and periglandular tissues. It has been shown that the arteries of the thyroid anastomose so thoroughly with those of the trachea and the esophagus that the trunks of all the thyroid arteries may be ligated without fear of necrosis of the gland (1).

Normally, then, there is this rich vascular supply to the gland, but it must be remembered that in thyrotoxic disease this normal vascularity is markedly increased. Polar ligation does not attempt to obstruct all such vessels, but only one or more of the main supply; thyroxin should have, consequently, no difficulty in gaining entrance to the systemic circulation in quantity.

Lahey agrees that ligation of all four poles does not cure the disease, but believes it ameliorates the symptoms in about 66 per cent. He speaks of the technical difficulty in exposing the artery and vein, and of the danger of tearing into the internal jugular vein in attempting ligation of the inferior thyroid vessels. There is no doubt but that the operation of ligating the superior and inferior vessels is a technically difficult procedure, especially in those instances in which one is dealing with a large gland in which the anatomic relations are not normally placed. In working through a small incision with venous bleeding constantly obscuring the field, all difficulties are greatly enhanced. These technical difficulties may, of course, be obviated by visual ligation following flap exposure of the structures, but such a procedure assumes the magnitude of the bilateral subtotal thyroidectomy. It is often a question whether or not in ligations attempted through small incisions, the vessels exposed and tied are correctly identified.

Because of the vascularity of the gland and its inherent richness and anastomosing blood supply, or perhaps because of the occasional failure to ligate the proper vessels either numerically or anatomically, we do not believe that polar ligations are usually followed by sufficient improvement. With this thought, a tentative approach was made to the problem by initiating the procedure of lobectomy in a selected group of cases which ordinarily would have been subjected to polar ligation. The results would seem to show that if a patient is a sufficient risk for polar ligation, he may undergo, with practically equal safety, a unilateral subtotal lobectomy with a

From the Department of Surgery, Northwestern University Medical School and the surgical services of the Cook County and University Hospitals, Chicago.

TABLE I

| | Two lobectomies | One lobectomy |
|---|---|---|
| Average age—years | 38.1 | 41.2 |
| Average high basal metabolic rate on entrance | 58.8 | 44.8 |
| Average basal metabolic rate following 1st stage lobectomy | 26.8 | 12.5 |
| Average time between operations—months | 4.4 | .... |
| Type of disease | | |
| Thyrocardiacs | 9 | 6 |
| Toxic | 9 | 7 |
| Iodine resistant | 5 | 0 |
| | 23 | 13 |
| Type of gland | | |
| Exophthalmic goiters | 22 | 7 |
| Toxic adenomas | 1 | 6 |
| | 23 | 13 |
| Average duration of disease—years | 1.41 | 1.78 |
| Longest duration—years | 5 | 4.5 |
| Shortest duration—months | 2 | 2 |
| Mortality—cases | 0 | 1 |
| Total cases | 23 | 13 |

resultant improvement far greater than could be expected by one or more successive ligations. We are able to report at this time a series of 36 such lobectomies, 23 of which were completed by removal of the remaining lobe. There are 14 of these poor risk patients who have had one lobe removed, 13 of whom at the present time have refused further surgery *because of the marked improvement in their condition.* There has been one postoperative death in this group, occurring in a patient with mitral stenosis and beginning cardiac decompensation.

It is of importance to note that in this series an average reduction in the metabolic rate following removal of the first lobe occurred from an average height of 58.5 per cent to 26.8 per cent within a maximum period of 4 weeks, and so great was the improvement in many of these cases that they were convinced with difficulty as to the necessity of completion of the operation. As we have stated before, 13 of these patients would not return because of what they felt to be a complete cure. This factor is in itself of extreme importance, because in our experience, their improvement will in all cases be temporary, and an exacerbation of their symptoms will be the rule and not the exception.

In general, it may be said that the indications for a lobectomy may be classified as those which usually have been advanced for polar ligation (4). Specifically, they may be classified into the following groups.

TABLE II.—TYPES OF DISEASE—SINGLE LOBE REMOVED WITHOUT COMPLETION OF OPERATION

| | Age | Basal metabolic rate before | Complication | Duration of disease |
|---|---|---|---|---|
| Thyrocardiac | | | | |
| M. W. | 61 | 31 | Cardiac asthma with fibrillation | 2 years |
| R. C. | 20 | 10 | Marked cardiac damage | 1 year |
| B. H. | 40 | 57 | Double mitral with auricular fibrillation | 2 months |
| F. D. | 54 | 53 | Angina pectoris | over 1 year |
| M. S. | 42 | 57 | Cardiac asthma | 1 year |
| E. D. | 53 | 15 | Hypertension | 1 year |
| Intensely Toxic | | | | |
| C. Z. | 50 | 68 | Fibrillation | 3 years |
| D. L. | 30 | 23 | Hypertension | 3 years |
| J. F. | 53 | 47 | Arteriosclerosis | 2 years |
| B. K. | 46 | 42 | Iodine resistant | 2 years |
| M. K. | 41 | 48 | Recurrence | 1 year |
| S. A. | 41 | 82 | Hypertension | 5 years |
| L. K. | 20 | 52 | Iodine resistant | 1 year |

1. *Intensely toxic cases* in which patients do not respond satisfactorily to the usual iodine preparation.

2. The so called "*iodine-resistant glands.*"

3. Those with outstanding *cardiac manifestations* not responding satisfactorily to treatment, whose symptoms are due either to primary thyrotoxic myocardial degeneration or are superimposed on an organic heart disease.

4. Those of *advanced age with systemic arteriosclerotic changes.*

5. Those with such associated pathology as would make them poor risks for any surgical procedure.

From the cases charted as shown, the most frequent indication for this procedure is in the group of intensely toxic patients. This group includes those that show little or no response to iodine medication, or are iodine resistant because of previously prolonged attempts at iodinization.

As is shown in Table III, the average drop in the basal metabolic rate following removal of the first lobe was 55.5 per cent. There were no cases included in this group which showed a failure in satisfactory reduction in metabolism following the primary lobectomy, nor are there any cases which show a stationary metabolism, or a tendency to elevation. All of these metabolic rates

were taken at the time of discharge of the patients from the hospital following surgical recovery from their lobectomy, and demonstrate not only the percentage of metabolic recoveries, but its rapidity following the initial operation.

These statistics may be compared to those recently published by Lahey and Schwalm, who report in their series an increase in the basal metabolic rate in 28 per cent of their patients, no change in 6 per cent, and a reduction in the rate in 66 per cent of patients following pole legation.

In our group of cases attention also may be called to the rapidity with which the drop in the metabolism takes place, and the comparatively low basal metabolic rate which precedes completion of the operation. As we have stated previously, the ease with which these patients pass through their postoperative course following removal of the second lobe is very much greater than is the course usually seen following the complete operation in the good risk thyroid patient.

In contradistinction to the usual procedure of maintaining patients on iodine therapy during the period elapsing between pole ligation and subsequent hemithyroidectomy or bilateral subtotal thyroidectomy, it is our belief that in the period between the stage operations of lobectomy the use of iodine is not indicated after their discharge from the hospital (2). The complete iodinization of the remaining lobe that has taken place in the course of the operative preparation should be sufficient to carry these patients during the interval between operations, which optimum time should be from 6 weeks to 3 months. The elimination of iodine therapy during that period lessens the possibility of overiodinization, with a resultant increase in risk to the patient from that complication at the time of the second operation. After such a rest period, their response to iodine as a preparatory procedure in the usual manner preceding removal of the remaining side has been extremely satisfactory in all of our cases.

Since overiodinization is one of the frequent indications for multiple stage operations, it is hardly logical to invite this complication as a possible factor previous to the removal of the remaining lobe.

We feel that in the operation of lobectomy there exists a procedure that can replace the operation of polar ligation without increasing the risk of mortality. It would seem that if a patient who is nominally a subject for polar ligation is subjected to a lobectomy the mortality should be no greater, but the consequent improvement should be so much more marked than that following polar ligation that the subsequent operation of completion may be undertaken with a risk less than that usually associated with a bilateral subtotal thyroidectomy in a good risk patient.

TABLE III.—CLASSIFICATION OF COMPLETED OPERATIONS

| Case | Interval between operations | Age | Basal metabolic rate | | | Duration of disease |
|---|---|---|---|---|---|---|
| | | | Before | After one lobe | End* | |
| **Iodine Resistant** | | | | | | |
| S. L. | 5 months | 19 | 54 | 15 | 11 | 2 years |
| T. B. | 3 months | 45 | 52 | 18 | 8 | 5 months |
| J. W. | 6 months | 46 | 72 | 47 | 14 | 6 months |
| K. H. | 2 months | 31 | 62 | 31 | 6 | 2 years |
| H. Y. | 6 weeks | 25 | 75 | 37 | 19 | 2 years |
| **Thyrocardiac** | | | | | | |
| M. C. | 2 months | 48 | 31 | 12 | −22 | 9 months |
| J. P. | 6 weeks | 20 | 59 | ? | ? | 6 months |
| I. S. | 3 weeks | 44 | 40 | 20 | 0 | 3 months |
| M. C. | 3 months | 50 | 46 | 38 | 4 | 5 years |
| F. C. | 8 years | 38 | 40 | 28 | 14 | 1 year |
| S. D. | 2 months | 41 | 83 | 32 | 7 | 2 years |
| A. W. | 6 months | 46 | 42 | 33 | 11 | 3 years |
| M. G. | 3 months | 30 | 72 | 23 | 8 | 9 months |
| A. Z. | 8 weeks | 44 | 50 | 28 | −8 | 3 years |
| **Toxic** | | | | | | |
| M. D. | 4 months | 16 | 74 | 7 | −3 | 9 months |
| L. S. | 4 months | 57 | 86 | 13 | −2 | 5 years |
| E. E. | 2 years | 16 | 52 | 27 | 15 | 2 months |
| L. B. | 7 months | 14 | 51 | 15 | 7 | 6 months |
| H. L. | 3 months | 21 | 78 | 32 | 18 | 6 months |
| M. V. | 6 weeks | 18 | 82 | 18 | 11 | 1 year |
| I. Z. | 2 weeks | 24 | 52 | 40 | 10 | 3 months |
| T. C. | 2 weeks | 45 | 57 | 17 | 18 | 5 months |
| A. L. B. | 9 months | 41 | 44 | 10 | −2 | 8 months |
| | Average | | 58.8 | 26.8 | 6.5 | |

Percentage of 55.5 drop in basal metabolic rate.
*Time of basal metabolic rate taken following completion of operation varies.

## CONCLUSIONS

1. Thirty-five of 36 thyrotoxic patients who were too poor risks to withstand a bilateral subtotal thyroidectomy have been successfully operated upon by the method of two stage lobectomy.

2. Thirteen of 35 patients have refused subsequent operation following primary lobectomy because of the marked improvement in their general condition.

3. Primary lobectomy in this series has reduced the average basal metabolic rate from 58.5 per cent to 26.8 per cent, or a percentage reduction of 55.5. There has been a definite drop in the basal metabolic rate in each instance.

4. The postoperative course following the removal of the second lobe is usually milder than that following bilateral subtotal thyroidectomy in the good risk patient.

5. Two stage lobectomy in the poor risk patient with thyrotoxicosis would seem to be the operative procedure of choice, and may replace the operation of polar ligation.

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# PONTOCAINE SPINAL ANESTHESIA IN UROLOGY

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OUR experiences with pontocaine as a spinal anesthesia in 1000 urological operations serve as the basis for this study. The introduction of pontocaine as a local anesthetic by Schmidt (28), Weidhopf (37), Fussganger and Schuman (8) in 1931 was almost immediately followed by its use as a spinal anesthetic, Schmidt (30, 31), Pfitzner (24), Lundy (14), Essex (5), and Marvin (17). Ever since Einhorn introduced procaine, 1904, a search has continued for an anesthetic of similar, but more prolonged action with less blood pressure depression when used intraspinally. It was early believed that all amino-benzoic acids, alkyl-amino-benzoic acids, di-amino-benzoic acids, and amino-cinnamic acids could form the basis of alkamine esters which would produce as satisfactory, but more prolonged anesthesia than procaine. Pontocaine is one of the results of this search and is structurally the monohydrochloride of the beta-dimethyl-amino-ethyl-ester of 4-butyl-amino-benzoic acid. It is a white crystalline powder with a melting point of 146 to 147 degrees C., which is easily soluble in distilled water or normal saline. A 1 per cent solution is not affected by alkalies in glass, will stand prolonged and repeated heat sterilization, is not changed by brief freezing, remains stable for long periods, is crystal clear, has a hydrogen-ion concentration of 5.8, and a specific gravity of 1.0068 at 25 degrees C. which compares with spinal fluid averages of 1.001 to 1.009.

The *toxicity* of pontocaine has been adequately studied by competent observers, but we believe it correct to speak of an absolute, and a relative or clinical toxicity.

Weidhopf demonstrated in a comparative study of toxicity of similar agents that upon intravenous injection, procaine produces death at the dosage of 55 to 60 milligrams per kilogram of body-weight, while pontocaine's lethal dose on the same scale is 6 to 10 milligrams. Upon subcutaneous injection, procaine has a death point of 450 milligrams per kilogram and pontocaine has one of 20 to 30 milligrams per kilogram.

Fussganger and Schuman conclude that pontocaine is about 9 times more toxic than procaine, and death is due to respiratory paralysis. Runge and Schmidt have concluded that, comparatively, pontocaine is 6 times more toxic than procaine on intravenous dose, but when used on basis that clinically 1 milligram of pontocaine is equal to 10 milligrams of procaine, then pontocaine is actually less toxic. This conclusion is repeated by Schmidt a year later (31). Lundy and co-workers (14, 15) repeated studies on toxicity and conclusions were obtained similar to those of other observers. Marvin states if procaine is given a value of 1 on intravenous toxicity tests, then pontocaine is 5.8 times more toxic, but intraspinally no alarming reactions occurred with either drug in clinically standardized doses. A comparison showed that 20 to 30 millimeters of mercury drop is the average systolic fall after procaine, but 0 to 10 millimeters of mercury drop is the average after pontocaine.

In the laboratory studies, death from a toxic dose was always due to respiratory failure, because the heart beat continued for some additional time (8). In the only deaths reported following pontocaine (2, 19) the patients ceased breathing some time before the heart stopped. From clinical and laboratory studies following toxic doses of procaine, it is demonstrated that life can be saved if artificial respiration is carried on until spontaneous breathing returns (45, 15). Lundy (5) revived a dog after 7½ hours of artificial respiration following a lethal dose of procaine. Similar conclusions apply to pontocaine. The fate of pontocaine is analogous to that of procaine on which extensive studies of Dunlop and Essex (15, 5) proved that it is the liver that removes procaine from the blood.

From the clinical aspect, toxicity is judged by gastro-intestinal reactions, blood pressure and respiratory changes, length of anesthesia, post-operative neurological sequelæ, and deaths attributed to the anesthesia. In our series of 1000 operations, there were 65 patients who complained of gastro-intestinal distress—58 being nauseated, 7 vomiting. This reaction invariably occurred early in the anesthesia, usually in nervous individuals, and disappeared in 10 to 15 minutes. In several instances it followed too rapid intraspinal injection. Blood pressure readings showed an average fall of 12 millimeters with a maximum of 22 millimeters and a minimum of 4. It is a uniform finding of most investigators that ponto-

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caine spinal anesthesia induces only a slight blood pressure fall (2, 3, 6, 9, 19), which is uniformly less than that observed with procaine (41). Respiratory disturbances occurred in 148 of our cases. Shallowness complained of by patient for first 10 to 15 minutes was noted in 87. There were 61 patients requiring moderate stimulation of carbon dioxide and oxygen inhalation for brief periods to overcome transient shallow respiration.

The length of surgical anesthesia has averaged beyond 2 hours (as we rarely tested to deep needle puncture after that time). The shortest duration was 1½ hours, the longest, 3 hours and 5 minutes. The sensation returned on an average of 6¾ hours after the intraspinal injection, and movements became voluntary shortly after the sensations were perceptible.

The neurological sequelæ were normal. The spinal fluid was examined in 100 cases of conveniently available patients, and fluid obtained at 24 hours on 14, 48 hours on 23, and after 5 to 7 days on 63. At 24 hours an increase in protein was always present, and cell counts varied from 10 to 60. Glucose was occasionally present. At 48 hours, albumin occasionally was present, cell count 0 to 15, postoperative headaches never complained of, and reflexes responded as on entrance at physical examination. The 5 to 7 day postoperative specimens showed all normal findings except in 2 patients with syphilis. Of the patients, 250, who have been seen 1 and 2 years after operation, normal findings were observed. Schmidt (30) reported on a controlled group of 510 pontocaine spinal anesthesia patients. He had a neurologist examine his patients after 24 to 48 hours, and found normal reflex signs, with spinal fluid changes of slight increase in cell count, rise in protein, and occasional presence of albumin, all of which were returned to normal findings 60 hours after operation. There were less than 5 per cent headaches. At the end of 1 year, the same neurologist examined the same patients and reported all normal findings. Postoperative findings reported by Bull and Esselstyne following pontocaine show no cases of shock, no headache, no neurological sequelæ, normal spinal fluid cell counts but 2 unexplainable deaths, probably due to the anesthetic.

The efficiency and duration of pontocaine induced spinal anesthesia depend upon the method of administration, the controlling factors being the rapidity of injection of the anesthetic, barbotage, the volume injected, the level of the injection, the miscibility of the drug with spinal fluid, and, finally, the position of the patient immediately after the injection. Our procedure is as follows: Ephedrine sulphate 50 milligrams in 1 per cent procaine is used to anesthetize the spinal needle tract in all patients with blood pressure up to 150 millimeters of mercury, systolic. For hypertensive cases no ephedrine is used. Ephedrine is a direct stimulant to the respiratory center (39) and the coronary (47) and peripheral vascular control (42). Its use in spinal anesthesia was introduced by Rudolph and Graham (44) and Ockerblad and Dillon (43). The lumbar space is chosen and a No. 22, short bevel spinal needle is used for the puncture, and the pontocaine used is a 1 per cent stock ampul solution. The patient is placed level, on his side.

The technique for patients of 135 pounds or over is:

No preliminary sedatives except to children. We prefer to administer sedatives, as needed, in the operating room.

*For bladder, pelvic, lower extremity surgery*—third and fourth lumbar space: for 1 hour, 1.5 cubic centimeters of pontocaine with 0.5 cubic centimeter of spinal fluid; for 1 to 3 hours, 1.75 to 2 cubic centimeters of pontocaine, no spinal fluid aspirated.

*For up to diaphragm, stomach, intestine, gall bladder, kidney, and scrotum*—first and second lumbar space: for 1 to 1½ hours, 1.75 cubic centimeters of pontocaine with 1 cubic centimeter of spinal fluid; for 1 to 3 hours, 2 cubic centimeters of pontocaine with ½ cubic centimeter of spinal fluid.

The average working dose is 1.75 cubic centimeters for short cases and 2 cubic centimeters for long cases.

Injection is at the rate of 2 cubic centimeters per minute.

The dose for patients under 135 pounds is figured as 1 cubic centimeter of 1 per cent solution for each 100 pounds body weight and to this is added ¼ cubic centimeter more for prolonged cases. Two cubic centimeters is the maximum dose.

The patient is turned on his back, kept level, and a pillow is placed under his head. After 10 to 15 minutes, the pontocaine becomes fixed in the tissues and any position desired may be assumed. A warm sensation occurs in feet and ascends the legs; anal reflex and motility disappear, and sensation loss to the upper abdomen followed by motility loss, is the usual process. Return of sensation and motility occurs in reverse order after 6 to 7 hours.

A cold towel is applied to the forehead. Unless surgically contra-indicated, we always allow a liberal sucking of ice. If the operation is continued more than an hour, a hypodermic of morphia is

then given in order to prevent restlessness. Upon return to bed, the patient may lie flat on his back or turn on his side, and have a pillow, and start taking fluids. After 6 to 8 hours, if no nausea has been present, we allow a light food intake, unless surgically contra-indicated.

The induction is smooth and rapid with an average time of 6 minutes for the appearance of surgical anesthesia. Perfect anesthesias were present in 959 patients, partial anesthesias in 40, of which a few required additional local anesthesia or a few inhalations of nitrous oxide. Complete failure of anesthesia occurred only once. It is of interest to note that the 1 failure and 40 partial failures all occurred in the first 500 cases and the last 500 were perfect, indicating that failure of anesthesia was probably due to faulty technique. The recovery from anesthesia has been uniformly smooth after about 6 to 7 hours.

We have found that the use of pontocaine is indicated in all types of urological surgery as follows:

| Cases | Spinal anesthesias |
|---|---|
| Transurethral resection, prostate | |
| 261 patients—2 stage | 522 |
| 41 patients—1 stage | 41 |
| Cystoscopy (difficult cases, litholapaxy, etc.) | 43 |
| Suprapubic cystostomy (stone, tumor, etc.) | 61 |
| Suprapubic prostatectomy (39 2 stage) | 78 |
| Renal surgery | 63 |
| Carcinoma, penis | 3 |
| Urethroplasty | 22 |
| Manipulation for ureteral stone | 78 |
| Scrotal surgery—epididymotomy, hydrocele, undescended testes, orchidectomy | 42 |
| Perineal prostatectomy | 1 |
| Perineal surgery—abscess, tuberculosis, etc. | 42 |
| Ureteral transplants | 4 |

Its distinct advantages are many, particularly the non-toxic effects on the renal function as compared with those of inhalant anesthetics. Since most urological surgery is undertaken on patients with some renal impairment, the use of pontocaine increases our margin of safety. Pontocaine, as was shown, has little to no effect on the blood pressure. In prostatic surgery, we frequently do a suprapubic puncture cystostomy with electrocoagulation of the prostate, depending upon the condition present at the first examination, waiting 6 to 7 days later to do the resection. This method was reported by us previously (46). In each of these procedures, surgical judgment is not hurried by a fading anesthesia, and in the rare cases of unexpected and difficult bleeding ample anesthesia persists for producing perfect hemostasis. In many of the plastic procedures, the time required is longer than anticipated, but we do not have to hurry. In renal surgery and in intra-abdominal ureteral transplants we obtain perfect relaxation and freedom from gastro-intestinal disturbance and as well sufficient time to cope with difficult situations.

Our youngest patient was 11 years and the oldest 91 years of age. Of the men, there were 867 spinal anesthesias, 270 of which had pontocaine spinal anesthesias twice, 6 had received it 3 times, and 1 had had it 5 times. Spinal anesthesia was given to 133 women, and of these 107 had it once, 13 had it twice.

Two hundred patients were asked their own preference, as to anesthesia. Of this number 49 had once been subjected to inhalation anesthesia, and 38 said they preferred the spinal; of the 151 remaining, 131 said they would prefer the spinal method if a future anesthesia were necessary and 20 said they did not like it.

In this series, there were no deaths attributable to spinal anesthesia.

## CONCLUSIONS

Pontocaine spinal anesthesia has been very satisfactory to us in urological surgery. It is slightly more toxic than procaine but when skillfully used no untoward reactions have occurred.

Its distinct advantages are smooth induction, perfect anesthesia for up to, and possibly beyond, 2 hours, complete absence of blood pressure depression, absence of disturbing gastro-intestinal reactions, smooth recovery, and total absence of neurological sequelæ.

The safety of any spinal anesthesia depends most upon the skill and experience of the administrator.

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# EDITORIALS

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## EMPIRICISM IN MEDICINE

ALTHOUGH medicine is generally credited as being one of the highly specialized branches of science, there are probably few sciences in which empiricism is used more frequently than in the treatment of disease. It is not difficult to see why empiricism has obtained such a hold in medicine when one realizes that the majority of ill patients will recover irrespective of the type of therapy used. Unless one is critical and analytical in his deductions, a particular therapeutic measure is likely to be given credit for improvement or recovery in disease when spontaneous resolution of the process is responsible for the recovery. Another reason why empiricism has continued to persist in medicine is because of the difficulty of drawing conclusions in clinical cases unless an extremely large amount of material is available. The number of variables in a group of cases does not permit standardization of all factors and in this way makes logical conclusions concerning the effects of therapeusis extremely difficult.

Fortunately, at the present time clinicians are relying more and more upon laboratory investigations and in this way are able to minimize the number of variables in a given series of observations so that logical conclusions can be drawn. Also the present day medical student is taught to think logically and not to accept as undoubted truth the teachings of his preceptors and predecessors.

Although Hippocrates had suggested the more or less modern conception of the physiologic treatment of wounds, Galen's teaching that pus was laudable was observed empirically for centuries with undoubtedly a tremendous toll of life and, in addition, prolongation of convalescence and resulting deformity. Even today the laity and many physicians believe that wounds must be actively treated and disregard the fact that resistance of the individual is of most importance. Until relatively recently the almost universally accepted opinion that pre-operative catharsis was not only desirable but also imperative for satisfactory postoperative convalescence of a patient was never disputed, largely because each student of medicine was told by his preceptor that such preparation was necessary. At the present time because of the observation that following emergency operations prior to which catharsis is not justified the postoperative convalescence is smoother and there is less depression of the intestinal activity, clinicians have been convinced that pre-operative catharsis is not only unnecessary but in the majority of instances is actually harmful. Although there are few, if any, surgeons who advocate pre-operative catharsis (except in

certain cases), there are many who believe that gas pains, abdominal distention, nausea, and vomiting should follow every laparotomy and that an absence of these distressing symptoms during the postoperative convalescence is the exception rather than the rule. Unquestionably many patients will continue to have abdominal distention, postoperative pain, and nausea if treated along empiric lines after operation. If, however, the physician will admit that the patient's gastro-intestinal tract following a laparotomy is functionally inactive due to stimulation of the splanchnics and if during this period the gastro-intestinal tract is treated as any other portion of the body which is inactive, these undesirable metalaparotomy symptoms can be entirely obviated. Sweetened drinks are administered after operation empirically by the majority of physicians, because presumably the carbohydrate is readily available and best tolerated. The ingestion of sweetened drinks by a patient whose gastro-intestinal tract is functionally inactive as a result of a physiologic ileus is one of the surest ways of prolonging the ileus, because, as shown by Fine, the readily available carbohydrate is easily fermented and causes increased distention of the bowel, which in turn causes increased secretion. Although the majority of physicians will prescribe fruit juices and other sweetened drinks to patients who have been recently operated upon and believe that they are employing the best form of therapy, they more frequently than not observe that following the ingestion of sweetened drinks abdominal distention is aggravated. Yet, rarely does this observation prevent the ordering of sweetened drinks for their next patient, because for years these drinks have been used empirically during convalescence from operations. Similarly, a patient who has abdominal distention and complains of gas pains is frequently treated by the administration of enemas and flushes. It is irrational to assume that the gastro-intestinal tract which is functionally inactive and already unable to empty itself of its contained fluid and gas will function normally after further overloading it by the administration of additional fluid in the form of an enema. Everything else being equal, the degree, the extent, and the duration of postoperative distention and gas pains are directly proportionate to the number and the size of the enemas and the flushes administered, and yet how many physicians will allow a patient to go 1, 2, or even 4 days without having a bowel evacuation because the necessity of daily evacuation has been empirically used.

Fortunately, because of the physiologic conception of disease and the rational therapy of pathologic conditions based upon physiologic principles, empirical treatment of disease at the present time is becoming less frequently used than previously; and, although many methods must still be used empirically, time will ultimately come when empiricism will become less frequently necessary.

ALTON OCHSNER.

## THE PASSING OF ENTEROSTOMIES

JUST when the operation of enterostomy was first practiced on man is not known.[1] Lautré says that it was by Heidenhain in 1897. The procedure reached its maximum popularity in this country a few years ago, many surgeons being enthusiastic while others have found it of questionable value. Its object has been principally for drainage of the intestine in cases of ileus, either mechanical or adynamic, and less often for the protection of intestinal suture lines from undue strain by gaseous distention.

[1] It was practiced upon horses and cows many centuries ago, and as in man, some survived it.

Drainage of the intestine has been greatly desired because of the assumption that death from ileus resulted from the absorption of toxic products from the contents of the bowel; though just what these products are has not been determined by the many searchers. The belief in such absorption has obsessed the human race for many centuries, and the surgeon has continued this erroneous idea into his practice. On the other hand, investigation has shown that there is little absorption of toxic products from the bowel, obstructed or otherwise, and particularly is this true if its wall is in a healthy condition. But in spite of the widely known fact that patients with low obstruction survive longer than those with high obstruction, though necessarily having greater intestinal area for absorption, this idea of absorption of toxic products still persists.

The most consistent and significant findings in cases of prolonged ileus, dynamic, adynamic, or paralytic, are loss of fluids, lowering of blood chlorides, increase of potassium and non-protein nitrogen and an increase in the combining power of carbon dioxide in the blood. One or more of these may be the fatal factor. Secondarily, there may be absorption of toxic products from the intestine when injury to its wall has resulted from impairment of its circulation which results from distention. Accompanying the impairment of the circulation there is also a disturbance of the normal exchange of fluids and gases between the blood stream and the lumen of the bowel.

Since distention plays such an important part in ileus, the enterostomy should be primarily to relieve or prevent it rather than to remove toxic fluids. Again, since intestinal gases play such an important part in ileus, their origin must be understood. Experience has shown that abdominal distention does not occur after operation if swallowed air is kept removed from the stomach. Gases produced from putrefaction and digestive processes, contrary to the general belief, are insignificant. On the other hand, swallowed air not only comprises probably 80 per cent or more of the intestinal gases, but of more importance is the fact that 79 per cent of air is nitrogen which is not absorbable. A sick patient suffering from nausea swallows more frequently and larger quantities of air than normal, and in a recumbent position eructation is difficult, which accounts for the rapid distention one often sees.

Enterostomy depends upon peristalsis to be efficacious but the traumatism from the operation delays peristalsis. No doubt in certain cases enterostomy may result very favorably, but in extreme cases it only hastens the end.

We are convinced that gastric suction, with few exceptional instances, will accomplish all that can be expected of an enterostomy. Gaseous distention can always be prevented if anticipated, and even after distention has occurred gases can be removed from practically the entire small intestine by suction. The ileocecal valve prevents return of colon contents, and in obstruction to the large bowel, enterostomy (colostomy), is still indicated. It is unnecessary to say that fluids and chlorides removed by suction must be replaced. With greater familiarity and efficiency in the use of gastric suction, the operation of enterostomy need rarely be resorted to.

ALBERT O. SINGLETON.

# MASTER SURGEONS OF AMERICA

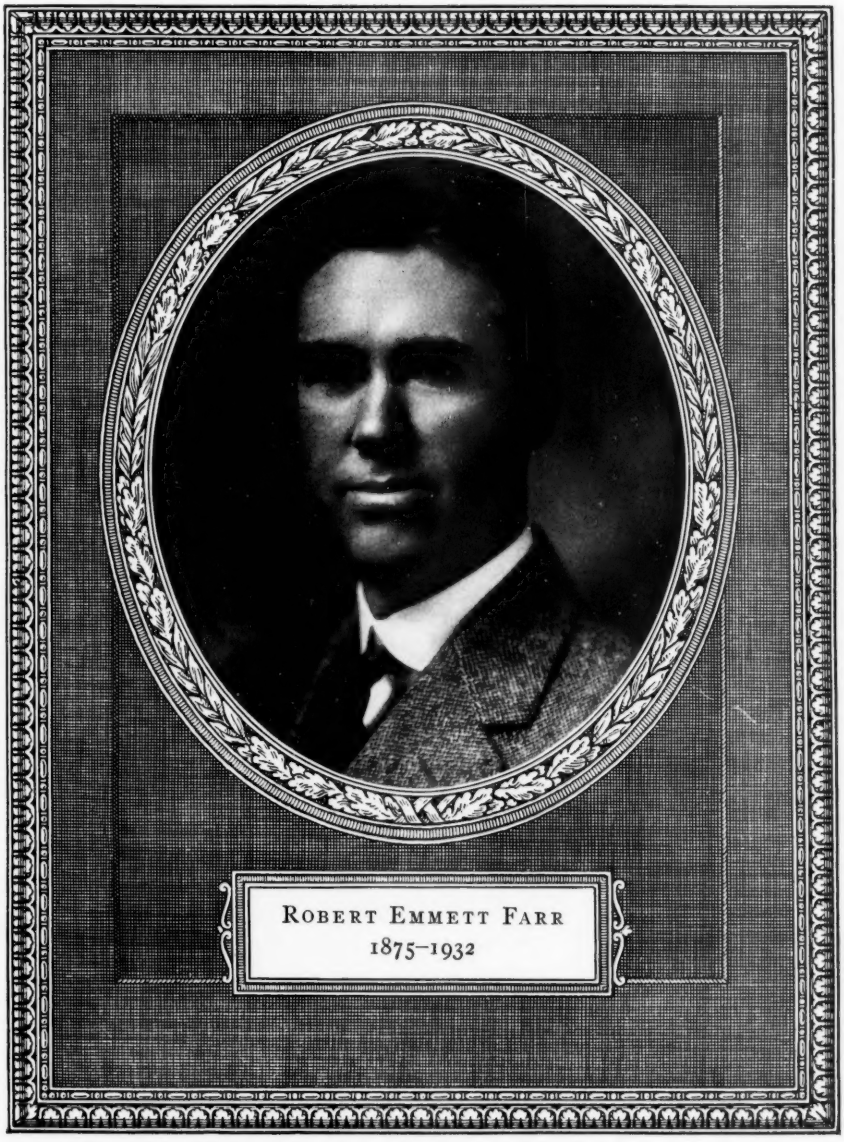
## ROBERT EMMETT FARR

ROBERT EMMETT FARR was born in Montello, Wisconsin, in 1875, and received his early education in the schools of that state. He was graduated from Rush Medical School, Chicago, in 1900. He served as interne at St. Mary's Hospital, Minneapolis, in 1900–1901. During his internship he became intimately acquainted with Dr. James Dunn, one of the outstanding surgeons of this community at that time. Later he became associated with Dr. Dunn, and this association continued until terminated by the death of Dr. Dunn.

Dr. Farr was married to Miss Mary Scallen of Minneapolis on April 29, 1902. One son was born to Dr. and Mrs. Farr. The tragic death of this son while he was well along in medical school was a source of much grief to Dr. Farr. The death of Mrs. Farr later added to this seemingly almost unbearable grief.

Dr. Farr was one of those rare individuals who devoted his entire time to the advancement of medicine and surgery. His mechanical turn of mind led him to devote much time to the development of special types of instruments and apparatus as well as special methods of performing operations that might aid in the simplification of surgery. There was no type of general surgery that he did not attempt, and no type that he did not do well.

While his work in all branches of surgery was highly commendable, his special efforts in developing the practicable side of local anesthesia stand out as his greatest achievement. His work with local anesthesia, no doubt, had much to do with creating the spirit of change from the old system of anesthesia. Many men had used local anesthesia at various times, even before the time of Dr. Farr, but no one man ever put forth the enthusiastic effort to establish its use firmly, as did Dr. Farr. He had many ingenious devices, all his own, for the successful administration of local anesthetics. His moving pictures of his technique, among the first of their kind, aroused interest at the various medical meetings throughout the country. While he brought out many practical points in the administration of local anesthetics, his method of establishing anterior splanchnic anesthesia was perhaps his greatest contribution. Anterior splanchnic anesthesia had been done by many men previously, but no other method was so simple and practicable as that of Dr. Farr. Negative intra-abdominal pressure was sought by many who attempted this form of anesthesia, but was accomplished by few other than Dr. Farr. Prominent medical men from various parts of this country and abroad visited his clinics, and usually left feeling they had profited by the visit.



ROBERT EMMETT FARR
1875–1932

UNIVERSITY OF MICHIGAN LIBRARIES

Dr. Farr contributed considerable to medical literature, but his text book on *Practical Local Anesthesia* stands out as his most important contribution in the literary line.

The Hennepin County and Minnesota State Medical Societies, as well as many others throughout the country, voted to recommend Dr. Farr for the Nobel Prize for his outstanding work in local anesthesia.

Although very much occupied with his practice, he was a regular attendant at all important medical meetings and took an active part in the development and organization of all things medical. Dr. Farr took an active part in establishing *Minnesota Medicine*, now the official journal of the State Medical Association. He served several years on its editing and publishing boards and was an important factor in bringing it to its present high standard.

He taught surgery at the University of Minnesota from 1902 to 1914, and at the Minneapolis General Hospital from 1906 to 1914. During this time he established himself as a real teacher of the sound principles of surgery.

One side of Dr. Farr's character was little known to those who were not in close association with him. He was generous to a fault. Seldom would he fail a friend in need. He was always ready to serve his friends professionally or financially if called upon to do so. His anxiety to assist the younger men was demonstrated by the generous assistance he gave many of them financially during their time in school as well as during their time of establishing a practice; and although he was by no means a wealthy man, he actually spent considerable sums of money in assisting these younger men.

The very unusual hypertrophic condition of his spine which developed comparatively early in his life occasioned him great discomfort and pain. Although he was still a young man, he was unable to carry on an active practice during the last 4 years of his life. Even with this seemingly insurmountable handicap, he continued to think and do things medical. During this time he completed the second edition of his book on *Practical Local Anesthesia* and wrote the chapter on local anesthesia for a popular system of surgery.

Dr. Farr was past president of the Hennepin County Medical Society, a member of the Minnesota State Medical Association, the American Medical Association, the Minnesota Academy of Medicine, the Western Surgical Association, the American Association of Obstetrical, Gynecological and Abdominal Surgeons, and a Fellow of the American College of Surgeons.

Dr. Farr's death occurred on June 30, 1932, at Minneapolis.

JAMES M. HAYES.

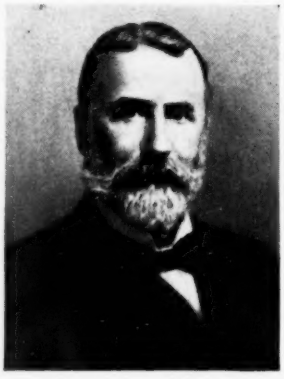
# LANDMARKS IN SURGERY

## THOMAS G. MORTON AND MORTON'S METATARSALGIA

PHILIP LEWIN, M.D., F.A.C.S., Chicago, Illinois

THOMAS GEORGE MORTON was born in Philadelphia on August 8, 1835, the son of Dr. Samuel G., physician and scientist (ethnologist and author of Crania Americana Egyptiaca), and Rebecca Grellet Pearsall Morton. He died at Cape May on May 20, 1903, of "cholera morbus." He studied first in the academic and then in the medical department of the University of Pennsylvania, receiving his medical degree in 1856, with a thesis on cataract. He was resident physician to the Pennsylvania Hospital in 1857 and pathologist and curator to its Museum from 1860 to 1864 when he was elected one of the surgeons of the staff; his connection with this hospital continued over forty years. He was surgeon to the Wills Eye Hospital 1859 to 1874 and founder and surgeon to the Orthopedic Hospital—later the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases—with Weir Mitchell co-operating to make it famous. During the Civil War, he served almost continuously as acting assistant surgeon.

He was quick and bright, always kindly and responsive, and especially alive to his civic obligations and to the claims of the poor. He was a notable figure in Philadelphia. His life was one of unusual activity and he performed successfully all of the major operations which in that day established the claim to the title of great surgeon.



Thomas George Morton
1835–1903
(*From American Medical Illustrated Dictionary*, courtesy W. B. Saunders Co.)

He did general practice for three years before devoting his entire time to general surgery. During the Civil War he was active in the military hospitals established in Philadelphia for the care of wounded soldiers. In 1864 he was elected surgeon to the Pennsylvania Hospital. In 1867 he founded the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases and was on its surgical staff until he died. He wrote extensively on mechanical as well as on ophthalmic and blood vessel surgery.

From May, 1862, to February, 1865, Morton was a colleague of D. H. Agnew at the Mowry Hospital, Chestnut Hill, Philadelphia, the largest army hospital in the United States, accommodating five thousand patients. He also organized the army hospital at Twelfth and Buttonwood Streets, Philadelphia. He was professor of clinical and operative surgery in the Philadelphia Polyclinic for Graduates, and his clinical lectures held at the Pennsylvania Hospital were attended by thousands of students. Morton devised a model hospital ward dressing carriage in 1866 which received a certificate of award by the United States Centennial Commission in 1876; a light truck for transferring patients in their beds from ward to clinical amphitheater, and an apparatus for measuring inequality in the length of legs.

In 1864 he ligated the common carotid for orbital aneurism; in 1866 he amputated at the hip joint; in 1867 he tied the subclavian between the scaleni and ligated the left internal iliac artery; in 1871 he cured a case of complete osseous ankylosis of the knee by excision; in 1877 he removed a dracunculus from the human eye; and excised the os calcis—all successfully. He performed the first successful laparotomy for appendicitis with the removal of the appendix, on April 27, 1886,[1] after losing a brother and then a son by this disease, on both of whom he had urged in vain the attending surgeons to operate.[2]

He first described the affection known as metatarsalgia or Morton's toe and devised the operation for its cure. In the January, 1876, issue of *The American Journal of the Medical Sciences*, Morton published a paper entitled "A Peculiar and Painful Affection of the Fourth Metatarsal-Phalangeal Articulation" in which he reported 12 cases of this disorder and described the anatomic structures and their relations in the lesion which has since been recognized as a clinical entity and is called Morton's toe, Morton's plantar neuralgia, or Morton's metatarsalgia.

He wrote:

> During the past few years I have had under my care a number of cases of a peculiar and painful affection of the foot which, so far as I am aware, has not been described. In these cases the pain has been localized in the fourth metatarsal phalangeal articulation; in several instances it followed at once after an injury of the

[1] Tr. Coll. Phys., Phil., 1887.

[2] Doctor Rugh mentions an episode which occurred in 1890 or 1891. Morton was quite radical regarding the appendix. Following the death of his two children very early in life from "perityphlitis" or "intestinal abscess" which was later found to be appendicitis, he advocated the removal of the appendix in all children at the earliest possible age.

From the Division of Surgery, Northwestern University Medical School, and the Orthopedic Services, Cook County and Michael Reese Hospitals.

foot, in others it was gradually developed from pressure, while in others there was no recognized cause.

In a report covering the histories and treatment of 12 cases he said:

From the number of cases which have been observed, it would appear that the affection is not so uncommon, only that, as a distinct disease, it has not heretofore been noticed. Of the 12 cases which I have reported, 11 have occurred in females. Besides these I have had 3 other cases making a total of 15; the neuralgia in 8 of the cases was clearly traced to a direct injury to a joint of the fourth toe; in 3 or 4 cases it originated from shoe pressure; and in the remainder no cause for the pain was assigned. The neuralgic paroxysms, and subsequent sensitive condition of the joint referred to, in some cases after continuing a variable period, without apparent cause, became less and less severe: inflammatory symptoms were not observed in any of the cases. In several instances where this neuralgia followed an injury, a rupture of the ligaments or parts about the joint of the fourth metatarsal was supposed to have occurred.

Morton ascribed the neuralgia to the peculiar position which the fourth metatarsal phalangeal articulation bears to that of the fifth, the great mobility of the fifth metatarsal, which by lateral pressure is brought into contact with the fourth, and lastly, the proximity of the digital branches of the external plantar nerve which are, under certain circumstances, likely to be bruised by, or pinched between, the fourth and fifth metatarsals. He attributed the great incidence in females not only to the great delicacy and pliability of the female foot as compared with the male foot, but perhaps in a measure to the prevailing custom, especially with fashionable women, of wearing tight and very narrow shoes. The fifth metatarsal is thus pressed against the head and neck of the fourth. The toes generally are irregularly crowded together and a painful condition of the foot may be induced and this, kept up, undoubtedly predisposes to more serious consequences.

In cases in which this form of neuralgia has been suddenly induced by an injury, the treatment should be vigorous, local blood-letting, anodyne applications, with long continued rest, until all sensitiveness of the joint has disappeared. In chronic cases, such as have been described, no other treatment except complete excision of the irritable metatarsophalangeal joint with the surrounding soft parts will be likely to prove permanently successful.

Morton tried to explain the mechanism of production of this condition and reproduced an illustration showing the plantar nerve with the digital branches of the external plantar to the fourth and fifth metatarsophalangeal articulations with the deeper branches to the same region.

Morton recommended in some cases a deep excavation corresponding with the joint of the fourth toe, in the sole of a broad shoe. It is interesting that one of his patients carried a vial of chloroform at all times as the only application which ever relieved her, and that was beginning to lose its effect.

In one case Morton said:

In this case it would appear that the neuralgia was in the first place caused by a sudden mal position of the metatarsophalangeal joint to the fourth toe, incident either to a relaxed state of the joint, or to a partial rupture of the ligaments which allowed the head of the bone to slip from its phalangeal articulation, thus subjecting the part to unusual pressure.

I am indebted to Dr. J. Torrance Rugh, Professor of Orthopedic Surgery, Jefferson Medical College, Philadelphia, for considerable personal data concerning Dr. Morton, and wish to express herein, my thanks.

# THE SURGEON'S LIBRARY

## REVIEWS OF NEW BOOKS

IN a volume of some 850 pages, Paul Titus presents his study of the *Management of Obstetric Difficulties*.[1] The subject matter is divided into eight sections as follows: sterility, difficulties in diagnosis of pregnancy, complications of pregnancy, complications of labor, obstetric operations, complications of the puerperium, the newborn infant, and a final section on general subjects, such as preparation for operation, analgesia, etc. There are 314 well chosen illustrations.

Section I is devoted to sterility and the subject is presented in a complete, clear manner. In addition to discussing the work and methods of others on this subject, Dr. Titus gives a résumé of his own works with statistics and presents a finale of "precautions in diagnosis and prognosis."

Section II deals with the diagnosis of pregnancy, and the difficulties in diagnosis and in determining its duration. The usual methods employed are discussed.

Section III treats of the complications of pregnancy and the major difficulties encountered during pregnancy, each subject being treated according to its importance: ectopic pregnancy, placenta prævia, ablatio placentæ, and toxemias; each is duly considered and the treatment of each is discussed in a most thorough manner.

Section IV treats of the complications of labor: dystocia due to abnormalities of the uterine contractile forces, developmental anomalies and gynecological abnormalities, with suggestions for the management of labor in all these conditions. Titus gives the (various) methods of pelvic mensuration and the means of determining the presence of a contracted pelvis, along with the various methods of management of labor in such cases. It is regrettable that Dr. Titus has not included the Hillis impression method in his discussion of this subject, for it lacks the objectionable features of vaginal manipulations when patient is near term or in labor.

The cause and treatment of intrapartum and postpartum hemorrhage are minutely dealt with and the value of transfusion and uterine tamponade are stressed. The prevention of injuries to the birth canal and the care of such injuries when they do occur are graphically described by word and pictures.

In the section on operative obstetrics the indications for various procedures are clearly set forth with pictures of the operative technique; visualization of the various procedures by drawings or photographs is a most important feature since the book is obviously intended for the student of obstetrics. An excellent section on the newborn infant stresses the treatment of asphyxia. If the management of this condition as outlined by Titus were generally followed there would be a marked reduction in fetal mortality. The remainder of the book is devoted to the preparation for obstetrical operation, postoperative care, analgesia and anesthesia, and the technique of intravenous injections, particularly dextrose solutions and blood solutions.

Titus quotes freely from other sources. If there are diversified opinions concerning the management of a given condition, however, he unhesitatingly states his views and gives his reasons for following any one procedure.

This volume will be most valuable as a ready reference for the student of obstetrics and deserves a place in the obstetrician's library.

CHESTER C. DOHERTY.

[1] THE MANAGEMENT OF OBSTETRIC DIFFICULTIES. By Paul Titus, M.D. St. Louis: The C. V. Mosby Co., 1937.

BY experimental and clinical study, Jona of Melbourne has endeavored to elucidate some of the more obscure etiological phases of renal pain. In his book *Kidney Pain*[1] the anatomy, physiology and pathology of the kidney, pelves, calyces, and ureters, are briefly reviewed. Pyeloscopy with an indwelling catheter has given some interesting observations. Pyelometry studies were carried out on anesthetized dogs and in human beings in conjunction with pyeloscopy and pyelography, the entire investigative procedure usually lasting 1 hour. Many graphs are included showing the variation of intrapelvic pressure on change of body positions and the injections of drugs, such as adrenalin, pituitrin, eserine, histamine, and others.

Clinical reports illustrating cases of renal pain due to distortion of rhythmical calycine, pelvic, and ureteral contractions are presented. Associated pathological abdominal conditions (appendicitis, gall-bladder disease) as the exciting factors in a few cases of renal dysfunction are exceedingly interesting. The case of antiperistalsis in which pyelography of the left kidney revealed antiperistalsis and regurgitation of the fluid in the right renal pelvis was well illustrated. On the other hand, some criticism may be offered. As was mentioned, the value of pyeloscopy and pyelometry in the presence of a large ureteral catheter may well be questioned. The normal pelvic capacity of the kidney as 10 cubic centimeters seems too high. The word "infundib-

[1] KIDNEY PAIN: ITS CAUSATION AND TREATMENT. By J. Leon Jona, D.Sc. (Adel.), M.D. (Melb.), M.S. (Adel.), F.R.A.C.S., M.C.O.G. London: J. & A. Churchill Ltd., 1937.

ulum" is invariably erroneously used to designate the renal pelvis. Recommending a nephrectomy only on the basis of a non-contracting calyx would seem inconclusive evidence except in rare instances. Citing a septic case of pyelitis cured by an injection of 1 cubic centimeter of pituitrin should be questioned because a catheter was simultaneously passed. The passage of a ureteral catheter alone has cured many cases of febrile pyelitis. While the study and effect of drugs on the renal pelvis and ureter represent an enormous amount of work, the results are not entirely convincing. A slight amount of imagination must be added to interpret all the described favorable influences.

This treatise is valuable in so far that it should stimulate further investigative work in this particular field. The author is to be commended for giving credit to other investigators who have contributed toward the many phases of this so exceedingly interesting study, namely: normal physiology and pathology of the renal pelvis and ureter.

L. W. RIBA.

NEVER again do I expect to have the responsibility of reviewing so important a book as Dr. Miller's *The Lung*.[1] To those who for many years have hoped that it would be written, and these include all who have been in any way interested in the structure of the lung, it needs no recommendation. Over a period of nearly 50 years, the name of William Snow Miller has become synonymous with pulmonary anatomy and with a type of painstaking histological research by which alone the finer structure of an organ can be discovered and which few have the devotion and genius to carry out. Dr. Miller's first paper on the lung was published in 1892 while he was working in the laboratory of Dr. F. P. Mall at Clark College in Worcester, Massachusetts. From that time until the present, in Germany under Werner Spalteholtz and for the past 45 years as professor of histology at the University of Wisconsin, he has worked steadily on the same subject and so successfully that he has discovered much that is new and on nearly every disputed point has contributed determining information. Now at the age of 79, he has summarized the results of his studies in this book. It is the history of the development of knowledge concerning the lung and an extremely lucid statement of its present status. It is a record of a unique achievement, of a life singularly devoted to the search for truth, and of an intelligence and temperament singularly adapted to scientific work. It places its author in the class of Vesalius, Fallopius, Willis, and the other great anatomists. It is not a small thing to have advanced knowledge so far in a field where discovery is so difficult. Dr. Miller's life and work should be an inspiration to all students of medicine and a criticism of any who may think any phase of it dull or well known.

Dr. Miller has been more than a great scientist. In the lecture room ,in the laboratory, and, particularly, in his library at the gathering of the medical history club, he has succeeded in transmitting to his students a regard for the high traditions of science and medicine, in imbuing them with the same enthusiasm which he in turn must have received from Mall and of which he has been so good a guardian. His consideration for this phase of his function accounts for his chief idiosyncrasy as a teacher. From each class he selected a small group of the more promising students. He saw that the rest learned what was necessary; these he encouraged and cultivated and on most of them has left his mark. Were his contributions to knowledge not a lasting monument to him, the men whom he has trained and influenced would suffice.

JEROME R. HEAD.

THE second edition of White's *Heart Disease*[1] has been predicated upon the popular reception of the first edition. The author has been an active contributor to cardiac literature for some years and is probably America's leading cardiologist. His extensive clinical experience clearly justifies publication of this text.

The author has succeeded splendidly in the difficult task of presenting the voluminous material covering the field of heart disease in a volume of this size. The subject matter is informative, well presented and accurate according to present standards of opinion. The bibliography is particularly well chosen.

The chapters on "rheumatic" heart disease, pulmonary heart disease, and coronary heart disease are especially well presented. The sections on heat in thyroid disease, especially hypertension, and syphilitic heart disease are not of the same standard. The section on disorders of cardiac function contain excellent material on angina pectoris and auricular fibrillation. One might question the division of space allotted to certain types of cardiac disease. Congenital heart disease, of rare occurrence, has been allotted 45 pages while syphilitic heart disease is discussed in a chapter of 12 pages. The student and practitioner may complain of Dr.White's frank statement of fact regarding the inadequacy of treatment in many cases. The author has added a well organized appendix on historical data regarding heart disease and the nomenclature of the American Heart Association for diagnosis, which he originally devised. Both of these constitute valuable additions.

The book is somewhat carelessly bound and printed. The type is well selected and the cuts of roentgenograms, electrocardiograms, and pathological specimens are well reproduced.

The book will be generally appreciated and it will undoubtedly rank as the best general text of heart disease on the American market today.

C. C. MAHER.

[1] THE LUNG. By William Snow Miller. Springfield, Ill., and Baltimore, Md.: Charles C. Thomas, 1937.

[1] HEART DISEASE. By Paul Dudley White, M.D. 2d ed. New York: The Macmillan Co., 1937.

# BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

THE TECHNIC OF LOCAL ANESTHESIA. By Arthur E. Hertzler, A.M., M.D., Ph.D., LL.D., F.A.C.S. 6th ed. St. Louis: The C. V. Mosby Co., 1937.

PRACTICAL ENDOCRINOLOGY; SYMPTOMS AND TREATMENT. By Max A. Goldzieher, M.D. 2d ed. New York and London: D. Appleton-Century Co. Inc., 1937.

EVERYDAY FIRST AID. By Walter Frank Cobb, M.D. New York and London: D. Appleton-Century Co., 1937.

HEART FAILURE. By Arthur M. Fishberg, M.D. Philadelphia: Lea & Febiger, 1937.

FISCHERISMS; BEING A SHEAF OF SUNDRY AND DIVERS UTTERANCES CULLED FROM THE LECTURES OF MARTIN H. FISCHER, PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF CINCINNATI. By Howard Fabing. A second and enlarged edition by Ray Marr. A private print for his students. Springfield, Ill., and Baltimore, Md.: Charles C. Thomas, 1937.

CHILDBIRTH: YESTERDAY AND TODAY; THE STORY OF CHILDBIRTH THROUGH THE AGES, TO THE PRESENT. By A. J. Rongy, M.D., F.A.C.S. New York: Emerson Books, Inc., 1937.

SAFELY THROUGH CHILDBIRTH; A GUIDE BOOK FOR THE EXPECTANT MOTHER. By A. J. Rongy, M.D., F.A.C.S. New York: Emerson Books, Inc., 1937.

INJURIES AND DISEASES OF THE HIP; SURGERY AND CONSERVATIVE TREATMENT. By Fred H. Albee, M.D., LL.D., F.A.C.S. Assisted by Robert L. Preston, M.D. New York: Paul B. Hoeber, Inc., 1937.

CHIRURGIA DELLE VIE OTTICHE INTRACRANICHE. By G. M. Fasiani and G. B. Belloni. Rome: Società Tipografica a. Manuzio, 1937.

THE ENDOCRINES IN OBSTETRICS AND GYNECOLOGY. By Raphael Kurzrok, Ph.D., M.D. Baltimore: The Williams & Wilkins Co., 1937.

TEXTBOOK OF DIAGNOSTIC ROENTGENOLOGY. By Lewis J. Friedman, M.D. New York and London: D. Appleton-Century Co., 1937.

OXFORD MEDICAL PUBLICATIONS. Tweedy's Practical Obstetrics. Revised and largely rewritten by Bethel Solomons, M.D., F.R.C.P.I., F.C.O.G., M.R.I.A., F.A.C.S. (Hon.), and Ninian McIntire Falkiner, M.D., Sc.D., F.R.C.P.I., F.C.O.G. 7th ed. New York and London: Oxford University Press, 1937.

SYNOPSIS OF DIGESTIVE DISEASES. By John L. Kantor, Ph.D., M.D. St. Louis: The C. V. Mosby Co., 1937.

A TEXTBOOK OF SURGICAL NURSING. By Henry S. Brookes, Jr., M.D. St. Louis: The C. V. Mosby Co., 1937.

CONSIDERACIONES SOBRE ALGUNAS AFECCIONES ANORECTALES. By Dr. Alfredo Velasco Sanfuentes. Santiago, Chile: Empresa Periodistica "El Imparcial," 1936.

OPERATIVE SURGERY; THE EAR, AIR PASSAGES AND NECK. By Dr. Martin Kirschner. With the collaboration of A. Lautenschlager and Dr. O. Kleinschmidt. Authorized translation by I. S. Ravdin, B.S., M.D., and George M. Coates, A.B., M.D. Philadelphia and London: J. B. Lippincott Co., 1937.

AN INVESTIGATION INTO QUESTIONS OF SOCIAL HYGIENE IN THE COUNTIES OF VÄSTERBOTTEN AND NORRBOTTEN, SWEDEN. Conducted with the support of the Royal Medical Board in 1929–1931. Published in Swedish in 1934. English, partly revised, edition. Lund: Håkan Ohlsson, 1937.

SYNOPSIS OF GYNECOLOGY. BASED ON THE TEXTBOOK DISEASES OF WOMEN. By Harry Sturgeon Crossen, M.D., F.A.C.S., and Robert James Crossen, M.D. 2d ed. St. Louis: The C. V. Mosby Co., 1937.

AMERICAN AND CANADIAN HOSPITALS. 2d ed. Chicago: Physicians' Record Co., 1937.

OBSTETRIC AND GYNECOLOGIC NURSING. By Frederick H. Falls, M.S., M.D., F.A.C.S., and Jane R. McLaughlin, B.A., R.N. St. Louis, Mo.: The C. V. Mosby Co., 1937.

THE PNEUMONOKONIOSES (SILICOSIS). LITERATURE AND LAW. BOOK III. By George G. Davis, M.D., Ella M. Salmonsen, Joseph L. Earlywine. Chicago: Chicago Medical Press, 1937.

TREATMENT BY DIET. By Clifford J. Barborka, B.S., M.S., M.D., D.Sc., F.A.C.P. 3d rev. ed. Philadelphia, London, and Montreal: J. B. Lippincott Co., 1937.

A TEXTBOOK OF HISTOLOGY. By Harvey Ernest Jordan, A.M., Ph.D. 7th ed. New York and London: D. Appleton-Century Co., 1937.

MANUAL OF THE DISEASES OF THE EYE; FOR STUDENTS AND GENERAL PRACTITIONERS. By Charles H. May, M.D., 15th ed. rev. with the assistance of Charles A. Perera, M.D. Baltimore: William Wood & Co., 1937.

ROSE AND CARLESS MANUAL OF SURGERY. American 15th ed. Edited by William T. Coughlin, B.S., M.D., F.A.C.S. From the 15th English ed. by Cecil P. G. Wakeley, D.Sc. (Lond.), F.R.C.S. (Eng.), F.R.S. (Edin.), and John B. Hunter, M.C., M.Chir. (Cantab.), F.R.C.S. (Eng.). Baltimore: William Wood & Co., 1937.

DISEASES OF THE NERVOUS SYSTEM IN INFANCY, CHILDHOOD AND ADOLESCENCE. By Frank R. Ford, M.D. Springfield, Ill., and Baltimore, Md.: Charles C. Thomas, 1937.

SCRITTI DI CHIRURGIA ERNIARIA; PER COMMEMORARE IL CINQUANTENARIO DELLA OPERAZIONE DI BASSINI. Vols. 1 and 2. Compiled by G. M. Fasiani and A. Catterina. Padua, Italy: R. Università di Padova, 1937.

OXFORD MEDICAL PUBLICATIONS. SKIN DISEASES IN GENERAL PRACTICE; THEIR RECOGNITION AND TREATMENT. By H. Haldin-Davis, D.M., M.A.Oxon., F.R.C.P. 3d. ed. London: Oxford University Press, 1937.

PRACTICAL TALKS ON KIDNEY DISEASE. By Edward Weiss, M.D. Springfield, Ill., and Baltimore, Md.: Charles C. Thomas, 1937.

ATLAS OF HEMATOLOGY. By Edwin E. Osgood, M.A., M.D., and Clarice M. Ashworth. San Francisco: J. W. Stacey, Inc., 1937.

# CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

EUGENE H. POOL, New York, *President* FREDERIC A. BESLEY, Waukegan, *President-Elect*
VERNON C. DAVID, *Chairman;* MICHAEL L. MASON, *Secretary, Committee on Arrangements*

## PROGRAM FOR THE 1937 CLINICAL CONGRESS IN CHICAGO

FOR the twenty-seventh annual Clinical Congress of the American College of Surgeons to be held in Chicago, October 25–29, the surgeons of Chicago, under the leadership of a representative committee, will provide a program of clinics and demonstrations that will present a complete showing of the clinical activities in all departments of surgery in this great medical center. The committee is assured of the hearty co-operation of the clinicians at the five medical schools and more than fifty hospitals that will participate in the clinical program.

There appears in the following pages a preliminary schedule of the operative clinics and demonstrations as prepared by the committee. Published in tentative form at this time the clinical program is to be revised and amplified during the months preceding the Congress. Clinics will be arranged for the afternoon of Monday, October 25, and for the mornings and afternoons of each of the four following days.

It will be noted that in addition to an ample and well-arranged schedule of operative clinics demonstrating the technique of a wide variety of surgical procedures, the committee has arranged a series of demonstration clinics at the medical schools and in the larger hospitals where the work being done in many special fields will be presented, including neurosurgery, traumatic surgery, thoracic surgery, plastic surgery, fractures, cancer, orthopedics, gynecology and obstetrics, genito-urinary surgery, experimental surgery, physical therapy, roentgenology, ophthalmology, otolaryngology, etc.

The committee has undertaken to so correlate the programs of the participating institutions as to provide the visiting surgeon an opportunity to devote his time continuously, if he so wishes, to clinics dealing particularly with the special subjects in which he is most interested. Thus, it is planned to arrange so that fracture clinics or cancer clinics, for example, will be available each morning and afternoon during the Congress.

The showing of surgical motion picture films, which so faithfully depict clinical features of major interest to most surgeons, will be continued at this year's session with an enlarged program of both sound and silent pictures with daily exhibitions at headquarters.

### EVENING SCIENTIFIC MEETINGS

Programs for a series of evening meetings, as prepared by the Executive Committee of the Board of Regents, appear in the following pages. At the opening session on Monday evening—the presidential meeting and convocation—in the ballroom of the Stevens Hotel, Dr. Vernon C. David, Chairman of the Committee on Arrangements, will deliver the address of welcome, following which a number of distinguished foreign guests will be introduced.

The retiring president, Dr. Eugene H. Pool, of New York, will deliver the presidential address which will be followed by the inauguration of the new officers: Dr. Frederic A. Besley, of Waukegan, president; Dr. Frank W. Lynch, of San Francisco, and Dr. Austin B. Schinbein, of Vancouver, vice-presidents. The 1937 class of initiates will be received into fellowship in the College at this session. A feature of this evening's program will be the annual College oration on surgery to be delivered by J. P. Lockhart-Mummery, M.B., B.Ch., F.R.C.S., of London, England.

Papers on surgical subjects of present day importance will be presented by eminent surgeons of the United States and Canada at sessions in the grand ballroom on Tuesday, Wednesday and Thursday evenings.

On Tuesday and Thursday evenings, in the north ballroom of the Stevens Hotel, eminent surgeons who specialize in the fields of ophthalmology and otolaryngology will present and discuss papers of interest to those whose work is limited to these particular fields. A detailed program for these two sessions will be published in the next issue.

### AFTERNOON SESSIONS

Cancer—graduate training for surgery—obstetrics and gynecology—industrial medicine and traumatic surgery—fractures provide the subjects for five afternoon conferences.

The cancer symposium on Tuesday afternoon, the program for which appears on a succeeding page, will cover a wide field of experience and research. Papers to be presented will discuss types of malignant growths that occur in various organs and glands and will give the results of different kinds of treatment or combination treatment by surgery, radium and x-ray. Of particular practical interest will be the presentation by three Philadelphia surgeons of their clinical observations of response to methods of refrigeration in metastatic carcinoma, which will show the correlation of body segmental temperature to this condition. At the conclusion of the session Dr. Bowman C. Crowell, head of the Department of Clinical Research, will present figures on five-year cures of cancer. Three years ago the College reported 24,440 five-year cures recorded up to that time.

A conference on graduate training for surgery on Wednesday afternoon (see program in the following pages) is designed to emphasize the importance of more extensive and thorough practice of surgery under supervision before a surgeon embarks upon a more independent career. All Fellows of the College, interested as they are in elevating the standards of their profession and in protecting the public from incompetent practitioners, will want to hear the views of the various speakers on how to provide more opportunities for graduate study and why such study should be encouraged. These views will be presented in a panel discussion in which representatives of various surgical groups will participate. Preceding the discussion a special field representative of the College will present findings from a 1937 survey of opportunities for graduate training provided in hospitals.

A symposium on obstetrics and gynecology will be held on the same afternoon, Wednesday. (Program on succeeding page.) Not only the specialist in this field, but the general surgeon as well, will find the subject matter to be covered in this session of interest.

A conference on industrial medicine and traumatic surgery on Thursday afternoon (see program) will include discussion of many subjects of interest to practitioners outside, as well as those in, the industrial field, since injuries resulting from accidents in the home, on the athletic field, and on the highways are often similar in nature to those which are sustained in industrial accidents. New methods of management which have had beneficial results will be described. The Committee on Industrial Medicine and Traumatic Surgery will present the findings of the 1936–1937 surveys and will outline the general trend of medical service as provided by industry.

A symposium on fractures will be held on Friday afternoon (program appears on a succeeding page). Fractures occur so often in industrial accidents that the papers to be presented at this session will have almost equal interest to those of the preceding day for the industrial surgeon. Perhaps in no field of surgery have the results of improved procedures been more evident. The same types of fractures which with methods used a few years ago would have involved serious permanent disablement can now often be managed in such fashion that little or no disability results, and still better practices are constantly being evolved. Some of these will be described at the conference.

Handling of fractures and other traumatic surgery of various kinds will be demonstrated at Chicago hospitals during the week of the Congress. On display in connection with the scientific exhibition at the headquarters will also be apparatus and instruments for use in traumatic surgery.

### HOSPITAL CONFERENCE

Stressing those elements in hospital service which contribute most to the best possible care of the patient, the program for the twentieth annual hospital standardization conference (see detailed program in the following pages) presents opportunity for discussion of most of the important problems of hospital operation.

The regular sessions of the conference will be held at the Stevens Hotel every morning from Monday until Thursday, and the afternoons of the same days except Wednesday when demonstrations will be given in a number of Chicago hospitals.

At the opening session on Monday morning, Dr. Eugene H. Pool, president of the American College of Surgeons, will deliver an address, which will be followed by the report of the 1937 survey of hospitals and official announcement of the approved list by Dr. George Crile, Chairman of the Board of Regents. At the same session four important talks on the various obligations of the hospital, personality and psychology in the hospital, selection of internes and residents, and the effect upon medical and hospital services of hospital insurance plans will be presented.

The entire session Monday afternoon will be devoted to the medical staff conference, with consideration of how, when and where to hold it, the proper attitude toward it, and the results that may be expected. A feature of the program will be a model staff conference staged by the medical staff of the Ravenswood Hospital.

Organization, direction, control, and functioning of the clinical departments of the hospital will be considered at the Tuesday morning session, and the management of hospital personnel will be discussed from various viewpoints on Tuesday afternoon.

In view of the obvious desirability of considering more deeply the public relations of hospitals, an entire session on Tuesday evening will be devoted to discussion of this problem. This will be a joint session with the Chicago Hospital Council and the Chicago Hospital Association. Charles H. Schweppe, president of the fomer body, will preside. Talks are scheduled on how best to cooperate with the press in the handling of news involving hospitals, and how hospital administrators, hospital trustees, and members of the staff may aid in improving relations with the public.

Record librarians, whose behind the scenes activities furnish the basis for much of the progress in procedures in caring for the patient, will unite through their organization, the Association of Record Librarians of North America, with the hospital standardization conference in a joint session on Wednesday morning. How to evaluate medical records, how to develop a medical record consciousness in the hospital, the remunerative value of good records, and other phases of record keeping will be discussed. The Medical Record Librarians of Chicago will furnish a graphic illustration of how to co-operate in their activities in the hospital by presenting a sketch, "The Medical Record Librarian's Dream Comes True."

Co-operating with the conference, sixteen Chicago hospitals and the University of Chicago Clinics will hold demonstrations on Wednesday afternoon of many phases of hospital operation, from the organization and maintenance of a psychiatric department to the handling of laundry. Selection of the demonstrations which delegates wish to attend should be made at the time of registering.

The Thursday sessions will be conducted as panel round table conferences. Discussion on the various topics will be led by experts in each field. The general theme will be hospital administration and standardization problems. Business methods, call systems, nursing service, social service, air conditioning, income and technical service standards will be discussed at the morning session; standardization of furnishings, equipment and supplies, food service, professional problems of the small hospital, and other topics will be discussed at the afternoon session.

Hospitals in Chicago and vicinity will welcome visits by delegates to the conference and opportunity for such visits will be given on Friday. Information should be obtained at the headquarters for hospital registration and information at the Congress.

### HEADQUARTERS AND TECHNICAL EXHIBITION

Headquarters for the Congress will be established at the Stevens Hotel where the grand ballroom with its large foyers and other meeting-rooms on the second and third floors have been reserved for scientific sessions and conferences.

The Technical Exhibition will be located in the Exhibition Hall in which will be placed the registration and clinic ticket bureaus and the bulletin boards on which the daily clinical program will be posted each afternoon for the following day. Leading manufacturers of surgical instruments, x-ray apparatus, operating room lights, hospital apparatus and supplies of all kinds, ligatures, dressings, pharmaceuticals and publishers of medical books will be represented.

### ADVANCE REGISTRATION

The hospitals and medical schools of Chicago afford accommodations for a large number of visiting surgeons, but to insure against overcrowding, attendance at the Congress will be definitely limited to a number that can be comfortably accommodated at the clinics, the limit of attendance being based upon the result of a survey of the amphitheaters, operating rooms, and laboratories of the hospitals and medical schools to determine their capacity for visitors. Therefore, those surgeons who wish to attend the Congress are expected to register in advance.

A registration fee of $5.00 is required of each surgeon attending the annual Clinical Congress, such fees providing the funds with which to meet the expenses of the meeting. To each surgeon registering in advance a formal receipt for the registration fee is issued, which receipt is to be exchanged for a general admission card upon his registration at headquarters. This card, which is non-transferable, must be presented to secure clinic tickets and admission to evening meetings.

Admittance to clinics and demonstrations will be controlled by means of special clinic tickets, the number of tickets issued for any clinic being

limited to the capacity of the room in which that clinic is given. This plan provides an efficient means for the distribution of the visiting surgeons among the several clinics and insures against overcrowding.

RAILWAY RATES

Although no special rates have been authorized by the railways for the Clinical Congress in Chicago this year, and certificates will not be required, the railways in the western, northwestern, southwestern, and southeastern states will offer for sale in October round-trip tickets to Chicago at very low rates, with a 30-day return limit in certain territory and a 15-day return limit in other territory. Complete information as to rates, routes, and stop-over privileges may be obtained from local ticket offices. In the territory east of Chicago, north of the Ohio and Potomac Rivers, including the north Atlantic and New England states and eastern provinces of Canada, the regular rate of three cents per mile in pullmans and two cents per mile in coaches will be in effect.

CHICAGO HOTELS AND THEIR RATES

In addition to the headquarters hotel, the Stevens, there are several first-class hotels within short walking distance of headquarters, providing ample hotel facilities at reasonable rates. It is suggested that reservation of hotel accommodations be made at an early date. The following hotels are recommended by the Committee:

| | Minimum Rate with Bath | |
|---|---|---|
| | Single | Double |
| Auditorium, 430 S. Michigan Ave | $2.50 | $4.00 |
| Bismarck, 171 W. Randolph St | 3.50 | 5.00 |
| Blackstone, Michigan Ave. at 7th St | 4.00 | 6.00 |
| Congress, 500 S. Michigan Ave | 3.00 | 5.00 |
| Drake, Michigan and Lake Shore Drive | 4.00 | 6.00 |
| Great Northern, 237 S. Dearborn St | 2.50 | 4.00 |
| Harrison, 57 E. Harrison St | 2.50 | 3.50 |
| Knickerbocker, 163 E. Walton Pl | 3.00 | 5.00 |
| LaSalle, 10 N. LaSalle St | 3.00 | 4.50 |
| Morrison, 79 W. Madison St | 3.00 | 4.00 |
| Palmer House, 15 E. Monroe St | 3.50 | 5.00 |
| Sherman, 106 W. Randolph St | 2.50 | 4.00 |
| Stevens, 720 S. Michigan Ave | 3.00 | 4.50 |

# PROGRAMS FOR AFTERNOON SESSIONS

## SYMPOSIUM ON CANCER

*Tuesday, 2:00 P.M.—Ballroom, Stevens Hotel*

CHARLES A. DUKES, M.D., Oakland, Chairman of Committee on the Treatment of Malignant Diseases, presiding.

Correlation of Body Segmental Temperature and Its Relation to Metastatic Carcinoma; Clinical Observations and Response to Methods of Refrigeration. TEMPLE FAY, M.D., GEORGE HENNY, M.D., and AUGUSTUS MCCRAVEY, M.D., Philadelphia.

Topic to be announced. J. P. LOCKHART-MUMMERY, M.B., B.Ch., F.R.C.S., London.

Paget's Disease of the Nipple. SIR GEORGE LENTHAL CHEATLE, F.R.C.S., London.

Cancer of Esophagus. JOHN H. GARLOCK, M.D., New York.

Carcinoma of Thyroid. HAROLD L. FOSS, M.D., Danville, Pa.

The Role of Cystectomy in Malignant Tumors of the Bladder. CHARLES C. HIGGINS, M.D., Cleveland.

Presentation of Five-Year Cures. BOWMAN C. CROWELL, M.D., Chicago.

## OBSTETRICAL AND GYNECOLOGICAL CONFERENCE

*Wednesday, 2:00 P.M.—North Ballroom, Stevens Hotel*

FRANK W. LYNCH, M.D., San Francisco, Vice-President, American College of Surgeons, presiding.

Conservatism in Obstetrics. GEORGE W. KOSMAK, M.D., New York.

Water Balance in Relation to Toxemias of Pregnancy. M. EDWARD DAVIS, M.D., Chicago.

Abdominal and Pelvic Pain from the Gynecological Viewpoint. ARTHUR H. CURTIS, M.D., Chicago.

Cesarean Section. JOHN R. FRASER, M.D., Montreal.

Differential Diagnosis in Intestinal, Urinary and Gynecological Diseases. FLOYD E. KEENE, M.D., Philadelphia.

Syphilis in the Pregnant Woman. JAMES R. MCCORD, M.D., Atlanta.

## CONFERENCE ON GRADUATE TRAINING FOR SURGERY

*Wednesday, 2:00 P.M.—Ballroom, Stevens Hotel*

FREDERIC A. BESLEY, M.D., Waukegan, Ill., President, American College of Surgeons, presiding.

Opening Remarks. GEORGE CRILE, M.D., Cleveland, Chairman, Board of Regents, American College of Surgeons.

Purpose of Conference. MALCOLM T. MACEACHERN, M.D., Chicago, Associate Director, American College of Surgeons.

Graduate Training for Surgery. ALTON OCHSNER, M.D., New Orleans.

Findings from the 1937 Survey of Hospitals by the American College of Surgeons. MELVILLE H. MANSON, M.D., Minneapolis, Special Field Representative.

Panel discussion from the following viewpoints:

The Surgeon in the Teaching Hospital. DALLAS B. PHEMISTER, M.D., Chicago

The Surgeon in the Large Non-Teaching Hospital. DONALD GUTHRIE, M.D., Sayre, Pa.

The Surgeon in the Rural Community Hospital. HOWARD L. SNYDER, M.D., Winfield, Kan.

The American Surgical Association. EUGENE H. POOL, M.D., New York.

The American Board of Surgery. EVARTS A. GRAHAM, M.D., St. Louis.

The American Medical Association. FRED W. RANKIN, M.D., Lexington, Ky.

Significant Experiences in the Training of Surgeons on a Graduate School Basis. LOUIS B. WILSON, M.D., Rochester, Minn.

Discussion: Otolaryngology—PERRY G. GOLDSMITH, M.D., Toronto; Urology—FRANK HINMAN, M.D., San Francisco; Gynecology and Obstetrics—ARTHUR H. CURTIS, M.D., Chicago.

## SYMPOSIUM ON INDUSTRIAL MEDICINE AND TRAUMATIC SURGERY

*Thursday, 3:00 P.M.—Ballroom, Stevens Hotel*

FREDERIC A. BESLEY, M.D., Waukegan, Ill., Chairman of Committee on Industrial Medicine and Traumatic Surgery, presiding.

Recognition and Prevention of Lead Poisoning. ROBERT ARTHUR KEHOE, M.D., Cincinnati.

Reconstruction Surgery of the Face and Jaws. DR. MED. WOLFGANG ROSENTHAL, Leipzig.

Injuries of the Chest and Abdomen. EDMUND BUTLER, M.D., San Francisco.

The Modern Concept of the Industrial Medical Problem. M. N. NEWQUIST, M.D., Chicago.

Reconstruction of Scalp and Ear by Tube-Graft Method. JAMES A. CAHILL, JR., M.D., Washington, D.C.

Physical Therapy in Relation to Industrial Surgery. KRISTIAN G. HANSSON, M.D., New York.

## SYMPOSIUM ON FRACTURES

*Friday, 2:00 P.M.—Ballroom, Stevens Hotel*

FREDERIC W. BANCROFT, M.D., New York, Chairman of Committee on Fractures, presiding.

Organization of Regional Fracture Groups. CHARLES L. SCUDDER, M.D., Boston.

Functional Disabilities after Simple Fracture. FRASER B. GURD, M.D., Montreal.

Fractures of the Shaft of the Humerus. J. HUBER WAGNER, M.D., Pittsburgh.

Fractures of the Bones of the Hand. HUBLEY R. OWEN, M.D., Philadelphia.

Malunion in Fractures. WILLIS C. CAMPBELL, M.D., Memphis, Tenn.

Fracture of Both Bones of the Forearm (excluding Colles' Fracture and Fractures into the Elbow Joint). WILLIAM B. CARRELL, M.D., Dallas, Texas.

## PROGRAMS FOR EVENING MEETINGS

*Presidential Meeting and Convocation—Monday, 8:00 P.M.—Ballroom, Stevens Hotel*

Address of Welcome. VERNON C. DAVID, M.D., Chicago, Chairman, Committee on Arrangements.
Introduction of Foreign Guests.
Address of the Retiring President. EUGENE H. POOL, M.D., New York.
Inauguration of Officers.
Conferring of Fellowships. FREDERIC A. BESLEY, M.D., Waukegan, Ill., President.
Conferring of Honorary Fellowships. The President.
Annual Oration on Surgery: The Surgeon as a Biologist. J. P. LOCKHART-MUMMERY, M.B., B.Ch., F.R.C.S., London, England.

*Tuesday, 8:00 P.M.—Ballroom, Stevens Hotel*

Treatment of Peptic Ulcer:
Indications for Surgery. JAMES H. MEANS, M.D., Boston.
Technique of Surgical Treatment. ROSCOE R. GRAHAM, M.D., Toronto.
Nucleus Pulposus and Lower Back and Sciatic Pains. HOWARD C. NAFFZIGER, M.D., San Francisco.
The Relation of Chronic Cystic Mastitis to Cancer of the Breast. DEAN LEWIS, M.D., Baltimore.

*Wednesday, 8:00 P.M.—Ballroom, Stevens Hotel*

Lymphedema:
The Genesis and Consequences of Lymphedema. CECIL K. DRINKER, M.D., Boston.
Circulatory and Lymphatic Disturbances in the Abdomen. WILLIS D. GATCH, M.D., Indianapolis.
Diverticula of the Intestine. CLAUDE F. DIXON, M.D., Rochester, Minn.
Immediate or Delayed Treatment of Acute Cholecystitis (Liver-Shock and Death). HENRY W. CAVE, M.D., New York.

*Thursday, 8:00 P.M.—Ballroom, Stevens Hotel*

Tuberculosis of the Kidney. FRANK HINMAN, M.D., San Francisco.
Physiological and Pathological Changes in the Urinary Tract during Pregnancy. J. MASON HUNDLEY, JR., M.D., Baltimore.
Acute Pancreatitis. IRVIN ABELL, M.D., Louisville.
Fracture Oration: The Present Status of the Operative Treatment of Fractures. WILLIAM O'NEILL SHERMAN, M.D., Pittsburgh.

*Community Health Meeting—Friday, 8:00 P.M.—Ballroom, Stevens Hotel*

Program in preparation.

## ANNUAL HOSPITAL STANDARDIZATION CONFERENCE

*Monday, 10:00—Ballroom, Stevens Hotel*

EUGENE H. POOL, M.D., New York, President, American College of Surgeons, presiding.
President's Address.
Report of the 1937 Survey of Hospitals and Official Announcement of the Approved List. GEORGE CRILE, M.D., Cleveland, Chairman, Board of Regents, American College of Surgeons.
The Approved Hospital and Its Obligation—Diagnosis and Therapy, Education, Prevention and Research. BERT W. CALDWELL, M.D., Chicago.
Personality and Psychology in the Hospital. G. HARVEY AGNEW, M.D., Toronto.
Trends in Medical Education. JOHN H. J. UPHAM, M.D., Columbus, Ohio.
Criteria to be Observed When Selecting Internes and Residents. JAMES H. MEANS, M.D., Boston.
The Effect Hospital Insurance Plans Are Having on Medical and Hospital Services. C. RUFUS OREM, Ph.D., Chicago.

*Monday, 2:00—Ballroom, Stevens Hotel*

GEORGE E. WILSON, M.B., Toronto, Vice President, American College of Surgeons, presiding.
The Medical Staff Conference—with Panel Discussion from the Following Viewpoints:

General Presentation of Subject. HAROLD L. FOSS, M.D., Danville, Pa.
Proper Attitude of the Medical Staff. JAMES T. NIX, M.D., New Orleans.
Time, Place and Physical Essentials. WILLIAM H. WALSH, M.D., Chicago.
Conduct of the Conference. EDWARD L. TUOHY, M.D., Duluth, Minn.
Criteria of a Good Medical Staff Conference. FELIX P. MILLER, M.D., El Paso, Texas.
Demonstration—A model medical staff conference by the medical staff of Ravenswood Hospital, Chicago.

*Tuesday, 10:00—Stevens Hotel*

E. WELDON YOUNG, M.D., Seattle, Wash., presiding.
Clinical Departments of the Hospital, Embracing Organization, Direction, Control, Functioning.
Oral Surgery and the Dental Department in the General Hospital. WILLIAM H. G. LOGAN, M.D., Chicago.
Psychiatric Department in the General Hospital. SAMUEL W. HAMILTON, M.D., New York.
The Physical Therapy Department in Small, Medium and Large General Hospitals. JOHN S. COULTER, M.D., Chicago.
The Out-patient Department in the General Hospital. CHRISTOPHER G. PARNALL, M.D., Rochester, N.Y.
The Obstetrical Department in the General Hospital. OTTO H. SCHWARZ, M.D., St. Louis.

*Tuesday, 2:00—Stevens Hotel*

FRED G. CARTER, M.D., Cincinnati, presiding.
Hospital Personnel Management—with Panel Discussion from Various Viewpoints:
General presentation of subject. FRANK J. WALTER, Denver.
Selection. E. MURIEL ANSCOMBE, R.N., St. Louis.
Physical Health. HAROLD L. SCAMMELL, M.D., Halifax.
Assignment of Duties. CLINTON F. SMITH, Chicago.
Working and Living Conditions. JOSEPH G. NORBY, Milwaukee.
Morale. MACIE N. KNAPP, R.N., Normal, Ill.
Training and Education of Hospital Personnel. GEORGE O'HANLON, M.D., Jersey City, N. J.

*Tuesday, 8:00 P.M.—Stevens Hotel*

Joint Session—with Chicago Hospital Association and Chicago Hospital Council. CHARLES H. SCHWEPPE, Chicago, presiding.
Public Relations—with Panel Discussion from the Following Viewpoints:
General presentation of subject. PERRY ADDLEMAN, Chicago.
The Hospital Administrator. ADA BELLE MCCLEERY, R.N., Evanston, Ill.
The Member of the Medical Staff. FREDERIC J. COTTON, M.D., Boston.
The Press. HOWARD W. BLAKESLEE, New York.
Fund Raising. PAUL E. FESLER, Chicago.
Community Good Will. A. EDWARD A. HUDSON, Waynesboro, Va.

*Wednesday, 10:00—Stevens Hotel*

Joint Session with Association of Record Librarians of North America. R. C. BUERKI, M.D., Madison, Wis., presiding.
Developing a Medical Record Consciousness in the Hospital. SISTER M. PATRICIA, O.S.B., B.S., R.R.L., Duluth, Minn.
What Constitutes a Proper Appraisal of the Medical Record. CHARLES B. PUESTOW, M.D., Chicago, and LILLIAN H. ERICKSON, R.R.L., Milwaukee.
Incomplete Medical Records — Causes and Remedies. ALICE G. KIRKLAND, R.R.L., Oakland, Calif.
The Remunerative Value of Good Medical Records. RICHARD B. DAVIS, M.D., Greensboro, N. C.
The Technique of Making Group Studies of Diseases. THOMAS R. PONTON, M.D., Chicago.
Sketch—The Medical Record Librarian's Dream Comes True. Presented by the Medical Record Librarians of Chicago.

*Wednesday, 2:00*

Demonstrations in the following Chicago hospitals: Chicago Memorial, Children's Memorial, Cook County, Grant, Henrotin, Michael Reese, Passavant Memorial, Presbyterian, Ravenswood, Research and Educational, St. Elizabeth's, St. Joseph's, St. Luke's, St. Mary of Nazareth, University of Chicago Clinics, Wesley Memorial, West Suburban.

*Thursday, 10:00—Stevens Hotel*

Panel Round Table Conference—Problems Relating to Hospital Administration and Hospital Standardization. Conducted by ROBERT JOLLY, Houston, Texas, and R. C. BUERKI, M.D., Madison, Wis.
Call Systems for Hospitals. JOHN GORRELL, M.D., Grand Rapids, Mich.
Administrative Problems of the Small Hospital. GLADYS BRANDT, R.N., Logansport, Ind.
Nursing Service. SISTER MARY LIDWINA, Chicago.
Medical Social Service Standards. BABETTE JENNINGS, Chicago.
Air-Conditioning in Hospitals. PERRY W. SWERN, Chicago.
Hospital Income. BRYCE L. TWITTY, Dallas, Texas.

*Thursday, 2:00—Stevens Hotel*

Standardization of Hospital Furnishings, Equipment and Supplies. L. M. ARROWSMITH, Brooklyn.
Food Service. MIRIAM C. CONNELLY, Baltimore.
Professional Problems of the Small Hospital. MARY E. SKEOCH, R.N., Marquette, Mich.
Nursing Education. MARY M. ROBERTS, R.N., New York.
Out-Patient Department. FREDERICK MACCURDY, M.D., New York.
The Cancer Clinic in the General Hospital. FRANK E. ADAIR, M.D., New York.
The Hospital Pharmacy. EDGAR C. HAYHOW, Paterson, N. J.
The Front Office of the Hospital. LEE C. GAMMILL, Little Rock, Ark.

*Friday*

An opportunity will be afforded the hospital delegates to visit Chicago hospitals. Special information pertaining to each institution will be available at the hospital registration and information desk.

# PRELIMINARY CLINICAL PROGRAM

ARRANGED IN THE FOLLOWING SUBDIVISIONS: GENERAL SURGERY, GYNECOLOGY AND OBSTETRICS, ORTHOPEDIC SURGERY, GENITO-URINARY SURGERY, THORACIC SURGERY, FRACTURES, AND TRAUMATIC SURGERY, NEUROSURGERY, EXPERIMENTAL SURGERY, PLASTIC AND FACIOMAXILLARY SURGERY, PHYSICAL THERAPY, ROENTGENOLOGY, TUMORS AND IRRADIATION, OPHTHALMOLOGY, OTOLARYNGOLOGY

## GENERAL SURGERY

*Monday Afternoon*

### CHICAGO MEMORIAL HOSPITAL

CHARLES J. DRUECK, SR., GEORGE L. BROOKS, OTTO SAPHIR and GEORGE LANDAU. Symposium: Carcinoma of the rectum, carcinoma of the colon.

CHARLES E. KAHLKE, GEORGE L. BROOKS, OTTO SAPHIR and GEORGE LANDAU. Symposium: Peptic ulcer.

### PASSAVANT MEMORIAL HOSPITAL

SUMNER L. KOCH, MICHAEL L. MASON and HARVEY S. ALLEN. Surgery of the hand: Dupuytren's contracture, Volkmann's contracture, nerve and tendon suture, burn contractures of the hand and plastic repair with skin grafts, chronic tenosynovitis.

### ST. ANTHONY DE PADUA HOSPITAL

R. C. DRURY. Spinal anesthesia.

### ST. BERNARD'S HOSPITAL

R. J. FASIO. Blood transfusion, merits of methods.

### ST. LUKE'S HOSPITAL

T. HANSON and J. JANSEN. Treatment of comminuted fractures of the leg.

### WOMEN AND CHILDREN'S HOSPITAL

CLEMENTINE FRANKOWSKI and HELEN M. KOSTKA. Varicose veins, treatment by injection and by ligation.

*Tuesday Morning*

### AUGUSTANA HOSPITAL

N. M. PERCY. Operations.

### ALBERT MERRITT BILLINGS HOSPITAL

Clinical Demonstrations

LESTER R. DRAGSTEDT and staff. Clinical and experimental studies in gastric and duodenal ulcer.

WALTER L. PALMER, F. E. TEMPLETON and RUDOLF SCHINDLER. X-ray and gastroscopic studies of gastric ulcer under medical treatment.

A. BRUNSCHWIG. Pancreatoduodenectomy for carcinoma of the head of the pancreas.

H. P. JENKINS. Abdominal wound disruptions and the durability of catgut sutures.

### CHICAGO MEMORIAL HOSPITAL

CHARLES E. KAHLKE. Stomach surgery.

CHARLES J. DRUECK, SR. Surgery of the colon and rectum.

### COOK COUNTY HOSPITAL

KARL A. MEYER, R. H. JAFFE, M. J. HUBENY, AARON ARKIN and RUDOLF SCHINDLER. Symposium: Surgery of the stomach. Operations.

DR. GATEWOOD. Children's surgery.

GEORGE G. DAVIS, ALBERT H. MONTGOMERY, JOHN HARGER, HARRY JACKSON and JOHN G. FROST. Operations.

Members of the surgical staff will give demonstrations in surgical technique upon cadavers and dogs in the laboratories of the Graduate School of Medicine, 427 S. Honore Street.

### EVANGELICAL DEACONESS HOSPITAL

EDWARD N. HEACOCK. Cholecystectomy.

### GARFIELD PARK HOSPITAL

EDMUND FOLEY, PAUL SCHMITT, HAROLD WAIT, SAMUEL PLICE, CLAUDE WELDY and FRED DESTEFANO. Symposium: Gall-bladder disease.

### HOLY CROSS HOSPITAL

V. F. TORCZYNSKI. Cholecystectomy; appendectomy; hysterectomy.

M. J. BADZMIEROWSKI. Thyroidectomy, 5 cases; cholecystectomy.

J. P. DYBALSKI. Cholecystectomy, 3 cases; nephrectomy; hysterectomy.

A. J. MANIKAS. Appendectomy.

### JACKSON PARK HOSPITAL

G. M. LUCAS. Clinic.

W. MORLEY SHERIN. Gall-bladder surgery.

Symposium: Appendicitis

A. BAMBERGER. Surgical aspect.

R. R. JAMIESON. Medical aspect.

J. J. MOORE. Pathological aspect.

### LUTHERAN DEACONESS HOSPITAL

JOHN D. KOUCKY, G. H. MAMMEN and GEORGE H. SCHROEDER. Operations.

### MERCY HOSPITAL

Dry Clinic

C. F. SAWYER and associates. Unusual causes of intestinal obstruction; partial and complete gastrectomy.

M. MCGUIRE and associates. Pelvic appendicitis; obstructive jaundice.

### MOUNT SINAI HOSPITAL

V. SCHRAGER. Operations.

J. GAULT. Technique of high internal saphenous vein ligation.

P. KAPLAN. Tubulovalvular gastrostomy.

### PRESBYTERIAN HOSPITAL

KELLOGG SPEED, ALBERT H. MONTGOMERY, DR. GATEWOOD and associates. Operations.

V. C. DAVID, C. B. DAVIS and E. M. MILLER. Dry clinics.

### RAVENSWOOD HOSPITAL

Dry Clinic

P. J. SARMA. Varicose veins; ligation and obliterative treatment.

R. E. DYER. End-results of gastro-enterostomies, demonstration of cases.

D. B. POND and R. F. GREENING. Osteomyelitis.
J. J. MOORE. Tumors of breast.
D. L. JENKINSON. X-ray interpretations.
GEORGE DE TARNOWSKY. Exstrophy of bladder.
C. J. GEIGER. Ectopic ureter and absence of vagina; cervical carcinomas.
M. W. FIELD. Obstetric practice by general practitioner.
W. F. GROSVENOR. Toxemia in pregnancy.
W. C. HAMMOND. Endometriosis.

MICHAEL REESE HOSPITAL

D. C. STRAUS. Thyroid operations.
RALPH B. BETTMAN and WILLIAM TANNENBAUM. Gall-bladder surgery.
A. A. STRAUSS. Gastro-intestinal surgery.
JAMES PATEJDL. Operations.
P. SHAPIRO. Operations.

Symposium: Gastro-Intestinal Diseases

A. A. STRAUSS. Surgical treatment of peptic ulcer.
S. STRAUSS. Pre- and postoperative care of the patient.
JAMES PATEJDL. Perforating ulcer, surgical treatment.
JACOB MEYER. Medical care of the ulcer patient.

Symposium: Carcinoma of the Rectum

A. A. STRAUSS. Surgical.
S. STRAUSS. Surgical diathermy; after care and results of surgical diathermy.
M. APPEL. Histiocytic variation in cancer tissue.
GUSTAV KOLISHER. History of surgical diathermy.
OTTO SAPHIR. Pathology of the rectum following surgical diathermy.

RESEARCH AND EDUCATIONAL HOSPITALS

GEZA DETAKATS. Lumbar sympathectomy operation.

Symposium: Neurocirculatory Diseases

R. BRUNNER. Use of neosynephrine in spinal anesthesia.
WILLIAM C. BECK. Selection of cases for sympathectomy; demonstration of sympathectomized patients; evaluation of results; management of lymphedema.
F. K. HICK. Vascular accidents associated with coronary occlusion.
H. C. LUETH. Unusual reactions following the use of nitroglycerine.
GEZA DETAKATS. Treatment of acute arterial occlusion; operability of hypertension; demonstration of cases.
P. J. SARMA and H. L. MISHKIN. The treatment of varicose veins and ulcers.
J. T. REYNOLDS. Amputations in peripheral vascular disease.

ST. ANTHONY DE PADUA HOSPITAL

JOSEPH ZABOKRTSKY. Operations.

ST. BERNARD'S HOSPITAL

J. T. MEYER, E. J. MEYER and R. J. MEYER. Thyroidectomy.
W. G. EPSTEIN and M. MENNITE. Abdominal surgery and differential diagnosis of acute abdominal adhesions.

ST. JOSEPH'S HOSPITAL

WILLIAM C. BECK. Thoracic surgery.
AUSTIN A. HAYDEN. Conservation of hearing; mastoid and sinus surgery.
ARCHIBALD HOYNE. Control of contagion in surgical diseases.
WILLIAM H. G. LOGAN. Oral surgery.
FRANKLIN B. MCCARTY. Gall-bladder surgery.
CHARLES M. MCKENNA. Undescended testicle.
HUGH MCKENNA. Fractures: Conservative surgery in diabetic gangrene.
FRANK THEIS. Peripheral circulatory diseases.

Pathological and radiological material illustrating the above will be presented by LAWRENCE HINES, pathologist, and WILLIAM E. ANSPACH, radiologist.

ST. LUKE'S HOSPITAL

WILLIAM R. CUBBINS. Arthroplasties of hip joint.
GUY PONTIUS. Regional ileitis; local bowel resection for malignancy.
H. I. MEYER. Hashimato's disease.
H. E. MOCK. Operations.

ST. MARY OF NAZARETH HOSPITAL

GEORGE MUELLER. Regional ileitis.
EDWARD WARSZEWSKI. Ulcerative colitis.

VETERANS ADMINISTRATION FACILITY

PAUL F. BROWN. Operations.

WESLEY MEMORIAL HOSPITAL

R. W. MCNEALY, EMORY STRAUSER and F. L. HUSSEY. Gastric surgery.

*Tuesday Afternoon*

CHICAGO MEMORIAL HOSPITAL

BENNETT R. PARKER. Thyroid surgery.

COOK COUNTY HOSPITAL

EDWARD J. LEWIS. Operations.

HOLY CROSS HOSPITAL

M. J. BADZMIEROWSKI. Pre- and postoperative treatment of thyroid disease.

JACKSON PARK HOSPITAL

HARRY E. L. TIMM. Operations.

MERCY HOSPITAL

C. L. MARTIN. Rectal neoplasms and inflammations.

MUNICIPAL CONTAGIOUS DISEASE HOSPITAL

ARCHIBALD HOYNE and associates. Intubation and tracheotomy; discussion of the advantages and disadvantages of intubation and tracheotomy.

PASSAVANT MEMORIAL HOSPITAL

J. R. BUCHBINDER, A. C. IVY and ARTHUR BYFIELD. Symposium on the biliary tract.

MICHAEL REESE HOSPITAL

Dry Clinic

NATHAN CROHN. The use and abuse of the injection treatment of hernia; suitable and unsuitable cases, methods.
LEO ZIMMERMAN. Surgery of direct inguinal hernia.
RUDOLF SCHINDLER. The use of the gastroscope and its value to the surgeon.
SAMUEL GOLDBERG. Pooled human convalescent serum treatment of surgical streptococcus hemolyticus infections.
JAMES PATEJDL. Congenital duodenal obstruction in newborn; duodenal diverticuli causing clinical symptoms.

Dry Clinic

LEO ZIMMERMAN. Diseases of veins.
PHILIP SHAPIRO. Recent advances in the treatment of varicose veins.
BERNARD PORTIS. Embolism of the peripheral arteries.
SAMUEL PERLOW. Surgical measures used in the treatment of peripheral circulatory disturbances; differentiation between arterial and arteriolar spasticity as an aid in the selection of cases for sympathetic ganglionectomy.

ST. LUKE'S HOSPITAL

WILLIAM HAZLETT. Pseudohermaphroditism; carcinoma of breast in a fifteen year old girl.

ST. MARY OF NAZARETH HOSPITAL

P. DORETTI and T. PLANT. Abdominal operative clinic.

VETERANS ADMINISTRATION FACILITY

PAUL F. BROWN. Symposium: Stomach surgery.

WOMEN AND CHILDREN'S HOSPITAL

Management of Diseases Complicating Surgery

CAROLYN MACDONALD. Syphilis.
ROSE MENENDIAN. Endocrine disorders.
RUTH RENTER DARROW. Diabetes.

*Wednesday Morning*

AUGUSTANA HOSPITAL

A. T. LUNDGREN, EARL GARSIDE, R. J. E. OWEN and J. W. NUZUM. Operations.

CHICAGO MEMORIAL HOSPITAL

PETER S. CLARK, VANCE RAWSON, GEORGE LANDAU and OTTO SAPHIR. Gall-bladder symposium.
LEO M. ZIMMERMAN and RICHARD E. HELLER. Fundamental problems in the surgical treatment of inguinal hernia; modern management of varicose veins.

CHILDREN'S MEMORIAL HOSPITAL

A. H. MONTGOMERY, J. IRELAND, J. GRAHAM, W. POTTS, A. DIGGS and J. MUSSIL. Operations and demonstration of cases.

COLUMBUS HOSPITAL

D. A. ORTH and E. NORA. Bone and joint tuberculosis; peritonitis; Rollier treatment.

COOK COUNTY HOSPITAL

RAYMOND W. MCNEALY, MANUEL LICHTENSTEIN, FREDERICK TICE, RICHARD H. JAFFE and M. J. HUBENY. Symposium: Diseases of the gall bladder.
RAYMOND W. MCNEALY, VICTOR SCHRAGER, GEORGE L. APFELBACH, ROGER T. VAUGHAN and MARSHALL DAVISON. Operations.
Members of the surgical staff will give demonstrations in surgical technique upon cadavers and dogs in the laboratories of the Graduate School of Medicine, 427 S. Honore Street.

EVANSTON HOSPITAL

Symposium: Colon Surgery

L. D. SNORF. Diagnosis.
E. R. CROWDER. Roentgenology.
E. L. BENJAMIN. Pathology.
FREDERICK CHRISTOPHER. Surgery.
W. R. PARKES. Prognosis in malignancy.

Dry Clinic

MARCUS HOBART. Operative treatment of low back pain.
JAMES GRIER. Common bile duct obstructions.
W. K. JENNINGS. Prevention of recurrence in femoral hernia operations.

HOLY CROSS HOSPITAL

CHARLES M. MCKENNA. Cholecystectomy: herniorrhaphy.
J. F. DYBALSKI. Open reduction of fracture of femur.
F. KRAFT. Hysterectomy; perineorrhaphy.
F. SALETTA. Hysterectomy; perineorrhaphy; operation for shortening round ligament.
M. STRIKOL. Appendectomy; herniorrhaphy.

JACKSON PARK HOSPITAL

ARRIE BAMBERGER. Pre- and postoperative treatment of surgical cases.
C. C. CLARK and H. HOYT COX. Operations.

LUTHERAN DEACONESS HOSPITAL

GEORGE O. SOLEM. Surgical indications in peptic ulcer.

MOTHER CABRINI HOSPITAL

EUGENE J. CHESROW and ALBERT J. CHESROW. Operations.
E. P. OLIVIERI and N. V. EMANUELE. Demonstrations.

MOUNT SINAI HOSPITAL

E. I. GREENE. Anaerobic hemolytic streptococcus infection (Meleney's disease).
JACOB M. MORA. Thyroidectomy in the aged.
D. WILLIS. Removal of foreign (metallic) bodies from tissues with aid of a new instrument.
J. M. GREENE. Acute intestinal obstruction.
I. TRACE. Postoperative pulmonary complications with special reference to massive pulmonary collapse.
M. L. ARKIN. The surgical diabetic.
L. EDIDIN and N. I. FOX. Medicosurgical discussion.
L. FELDMAN. Streptococcic bacteriemia precipitated by surgical procedures.

MUNICIPAL TUBERCULOSIS SANITARIUM

CLEMENT L. MARTIN. Anorectal tuberculosis.
MAX THOREK. Surgery in tuberculous patients.

POSTGRADUATE HOSPITAL

EMIL RIES. Episacro-iliac lipomas with backache.

PRESBYTERIAN HOSPITAL

V. C. DAVID, KELLOGG SPEED, C. B. DAVIS, DR. GATEWOOD, E. M. MILLER, A. H. MONTGOMERY and associates. Operations.

MICHAEL REESE HOSPITAL

M. L. PARKER, LEE ZIMMERMAN and SAMUEL GOLDBERG. Operations.
B. PORTIS. Thyroid surgery.
SAMUEL PERLOW. Peripherovascular surgery.
A. A. STRAUSS, S. STRAUSS and J. PATEJDL. Gastro-intestinal surgery.
RALPH B. BETTMAN and WILLIAM TANNENBAUM. Gall-bladder operations.

Dry Clinic: Surgery of the Gall Bladder

SAMUEL SOSKIN. Preparation of the liver for surgery.
R. A. ARENS. The technique of cholecystography.
A. M. SERBY, S. PORTIS and G. LICHTENSTEIN. The evaluation of liver function tests; gall-bladder diet; survey of postoperative results of the gall-bladder group.
RALPH B. BETTMAN, LEO ZIMMERMAN and WILLIAM TANNENBAUM. Motion picture and diagrammatic demonstrations: The technique of cholecystectomy, choledocostomy, choledochogastrostomy or enterostomy.

RESEARCH AND EDUCATIONAL HOSPITALS

W. H. COLE. Thyroidectomy; operation for pyloric obstruction.
P. J. SARMA and H. L. MISHKIN. Clinic on varicose veins.

Symposium: Diseases of the Thyroid

W. H. COLE. Pre-operative care and postoperative complications.
C. B. PUESTOW. Use of silk in thyroidectomy.
L. SEED and R. BRUNNER. Blood pressure studies during thyroidectomy.
J. M. MORA. Hepatic damage in hyperthyroidism.

R. W. KEETON. Cardiac complications of hyperthyroidism.
W. H. COLE. Tracheal collapse.
JOHN HOWE. The thyroid gland as observed at autopsy in patients with diseases other than hyperthyroidism.
J. H. BAILEY. Bacteriological studies in the operating room.

ST. ANNE'S HOSPITAL

THOMAS E. MEANY. Fractures and tendon transplantations.
JOHN L. KNAPP and JOHN W. KEANE. Surgical clinic, demonstration of cases.
GEORGE F. THOMPSON. Surgical clinic, demonstrations.

ST. ANTHONY DE PADUA HOSPITAL

S. E. DONLON and H. P. SULLIVAN. Operations and demonstration of cases.

ST. BERNARD'S HOSPITAL

G. M. CUSHING. The surgical treatment of perforated gastric ulcer.

ST. LUKE'S HOSPITAL

S. W. MCARTHUR and associates. Symposium: Surgical conditions of the gall bladder and common duct.
E. L. JENKINSON. X-ray diagnosis.
GRANT LAING. Pre-operative and postoperative care.
S. W. MCARTHUR. Operative indications, type of procedure with some technical details.

U. S. MARINE HOSPITAL

O. E. NADEAU. Results in hernia surgery.
E. C. LUTTON and R. W. FLYNN. Spinal anesthesia.

WESLEY MEMORIAL HOSPITAL

WILLIAM MILLER. Review of gall-bladder surgery.

FRANCES E. WILLARD HOSPITAL

VICTOR L. SCHRAGER. Clinic.

WOMEN AND CHILDREN'S HOSPITAL

PEARL M. STETLER. Abdominal surgery.

*Wednesday Afternoon*

COLUMBUS HOSPITAL

D. A. ORTH, C. J. SCHERIBEL and E. D. NORA. Experimental thyrotoxicosis.
J. L. SPIVACK. Valve operation.

MICHAEL REESE HOSPITAL

Symposium

SAMUEL PERLOW. Paravertebral alcohol injections for the relief of cardiac pain.
LEO ZIMMERMAN and OTTO SAPHIR. Benign tumors of the thyroid gland.
SAMUEL GOLDBERG. Acute mesenteric lymphadenitis; strangulated hernias in premature infants.
THOMAS J. MERAR. Rectal complications of lymphogranuloma inguinale.
CASPER EPSTEIN. Fractures of the jaws.
M. L. PARKER. Carcinoma of the large bowel.

ST. ANNE'S HOSPITAL

HARRY J. DOOLEY. Urological clinic and demonstration.
JOHN J. GEARIN and E. P. GRAMER. Surgical clinic.

ST. BERNARD'S HOSPITAL

HERMAN DEFEO. The medical management of cholecystic diseases.
B. C. CUSHWAY and associates. Roentgen studies of gall-bladder diseases.
S. L. GOVERNALE. Cholecystotomy vs. cholecystectomy.
CHESTER GUY. Pathology of the gall bladder.

WESLEY MEMORIAL HOSPITAL

GUY S. VAN ALSTYNE. Abdominal surgery.

FRANCES E. WILLARD HOSPITAL

LOUIS F. PLZAK. Clinic.

*Thursday Morning*

AUGUSTANA HOSPITAL

N. M. PERCY. Operations.

CHICAGO MEMORIAL HOSPITAL

PETER S. CLARK, LEO M. ZIMMERMAN and M. L. WEINSTEIN. Gall-bladder surgery.

COOK COUNTY HOSPITAL

RICHARD H. JAFFE. Pathological conference.
KARL A. MEYER, GEORGE G. DAVIS, ALBERT H. MONTGOMERY and MAX THOREK. Operations.
Members of the surgical staff will give demonstrations in surgical technique upon cadavers and dogs at the Graduate School of Medicine, 427 S. Honore Street.

EVANGELICAL DEACONESS HOSPITAL

JOHN I. PERL. Stomach resection.

HOLY CROSS HOSPITAL

J. FRANCIS RUZIC. Choledochotomy and dilatation of common duct; vaginal hysterectomy; cholecystectomy.
J. FRANCIS RUZIC, D. DICIRO and WALTER EISEN. Resection of superior hypogastric ganglion.
D. DICIRO. Kidney neoplasm.
FRANCIS STREYSMAN. Varicocelectomy
JOHN SIMONAITIS. Pelvic laparotomy.

ILLINOIS MASONIC HOSPITAL

CHARLES DRUECK. Pruritus ani—cases due to systemic disturbances: Ovarian dysfunction (vicarious pruritus); hypothyroidism; spastic colon; obesity.

JACKSON PARK HOSPITAL

GEORGE M. LUCAS. Operations.

LUTHERAN DEACONESS HOSPITAL

JOHN D. KOUCKY, G. H. MAMMEN and GEORGE H. SCHROEDER. Operations.

MERCY HOSPITAL

L. D. MOORHEAD. Symposium: Goiter.

PASSAVANT MEMORIAL HOSPITAL

PAUL STARR. Symposium: Diseases of endocrine glands.

PRESBYTERIAN HOSPITAL

V. C. DAVID, C. B. DAVIS, WILLIAM MILLER and associates. Operations.
KELLOGG SPEED, DR. GATEWOOD and A. H. MONTGOMERY. Dry clinics and symposia.

MICHAEL REESE HOSPITAL

A. A. STRAUSS and S. STRAUSS. Gastro-intestinal surgery.
D. C. STRAUS. General surgery.

Thyroid Symposium

D. C. STRAUS. Group study and demonstration of thyroid records; surgical management of hyperthyroidism.
S. SOSKIN. The endocrine disturbance in a thyroid disease.
L. N. KATZ. Disturbed physiology of the cardiovascular system in thyroid disease.

M. LEV. Some clinical aspects of the heart in hyperthyroidism; medical management of hyperthyroidism.
A. S. BOHNING and L. N. KATZ. The electrocardiogram in thyroid disease.
W. W. HAMBURGER. Arrhythmias in thyroid disease.
B. PORTIS. Outpatient clinic management of hyperthyroidism.
B. PORTIS and H. ROTH. Treatment of hyperthyroidism complicated by pregnancy and syphilis.
R. LEVINE. Experimental treatment of hyperthyroidism.

RESEARCH AND EDUCATIONAL HOSPITALS

C. B. PUESTOW. Operations: Choledochostomy; carcinoma of rectum.

Symposium: Gall-Bladder Diseases

C. B. PUESTOW. The effect of cholecystectomy on pressure in the choledochus; gall-bladder fistulæ.
EDMUND FOLEY. Differential diagnosis between intrahepatic and extrahepatic jaundice.
W. H. COLE. The rôle of cystic duct obstruction to gall-bladder disease.
A. HARTUNG. The advantage of combining gastro-intestinal series with cholecystography.

ST. ANTHONY DE PADUA HOSPITAL

F. B. OLENTINE. Operations and demonstration of goiter and abdominal surgery cases.

ST. JOSEPH'S HOSPITAL

WILLIAM C. BECK. Thoracic surgery.
ARCHIBALD HOYNE. Control of contagion in surgical diseases.
WILLIAM H. G. LOGAN. Oral surgery.
FRANKLIN B. MCCARTY. Gall-bladder surgery.
CHARLES M. MCKENNA. Undescended testicle.
HUGH MCKENNA. Fractures; conservative surgery in diabetic gangrene.
FRANK THEIS. Peripheral circulatory diseases.

Pathological and radiological material illustrating the above will be presented by LAWRENCE HINES, pathologist, and WILLIAM E. ANSPACH, radiologist.

ST. LUKE'S HOSPITAL

F. L. MCMILLAN. Tumors of the colon.
H. E. MOCK. Infected granuloma; gall-bladder disease.
A. R. MORROW. Acute surgical abdomen.
C. E. SHANNON. Acute and chronic pancreatitis.
JOHN LINDQUIST. Appendicitis.
JOHN PRIBBLE. Axillary abscess.

ST. MARY OF NAZARETH HOSPITAL

J. C. HILL. Pathologic discussion of operative findings.
T. LARKOWSKI. Symposium: Hernias and their repair.

VETERANS ADMINISTRATION FACILITY

PAUL F. BROWN. Operations.

WESLEY MEMORIAL HOSPITAL

R. W. MCNEALY and associates. Surgery of jaundiced patients.
GUY S. VAN ALSTYNE. Carcinoma of the breast; combined surgical and x-ray treatment.

FRANCES E. WILLARD HOSPITAL

A. E. STEWART. Clinic.

WOMEN AND CHILDREN'S HOSPITAL

PEARL M. STETLER and MARIE ORTMAYER. Gastro-intestinal clinic; gastroscopic technique.
ALICE CONKLIN. Thyroidectomy.
ESTHER RAHN. Repair of ventral hernia.

*Thursday Afternoon*

CHICAGO MEMORIAL HOSPITAL

BENNETT R. PARKER, LEO M. ZIMMERMAN, WALTER S. PRIEST, OTTO SAPHIR and GEORGE M. LANDAU. Symposium: Thyroid disease.
FRANK WRIGHT, ALBERT ZRUNEK, LEO M. ZIMMERMAN, M. L. WEINSTEIN and OTTO SAPHIR. Symposium: Blood transfusion.

COOK COUNTY HOSPITAL

RALPH B. BETTMAN and EDWARD J. LEWIS. Operations.

HOLY CROSS HOSPITAL

J. FRANCIS RUZIC. Biliary tract surgery.

MICHAEL REESE HOSPITAL

Symposium: Gastro-Intestinal Surgery

LEON BLOCH. The medical treatment of ulcerative colitis.
A. A. STRAUSS. The surgical management of ulcerative colitis.
S. STRAUSS. The use of ileostomy in ulcerative colitis and carcinoma of the colon.
OTTO SAPHIR. Pathology of ulcerative colitis. Discussion.
R. ARENS. X-ray diagnosis of ulcerative colitis and peptic ulcer. Discussion.
A. A. STRAUSS and H. F. BINSWANGER. Medical and surgical treatment of terminal ileitis.

RESEARCH AND EDUCATIONAL HOSPITALS

Symposium: Diseases of the Gastro-Intestinal Tract

GEORGE MILLES. Pathology of carcinoma of stomach.
W. H. COLE. Total gastrectomy.
T. J. WACHOWSKI. X-ray diagnosis of carcinoma of stomach.
C. L. BIRCH. Anemia associated with total gastrectomy.
M. H. STREICHER. Diagnosis of carcinoma of the rectum.
C. B. PUESTOW. Surgical treatment of carcinoma of the rectum.
BERNARD PORTIS. Surgical treatment of complicated duodenal ulcers.
F. L. MCMILLAN. Regional ileitis.
J. L. SPIVACK. Tubovalvular stoma with particular reference to gastrostomy.
H. O. WERNICKE. The injection treatment of hernias.

ST. ANTHONY DE PADUA HOSPITAL

W. H. BRADLEY. Operations.

ST. BERNARD'S HOSPITAL

W. S. HECTOR and S. S. DUBOVY. Imperforate anus with atresia of large bowel.

ST. LUKE'S HOSPITAL

H. E. JONES. Reconstruction of the common duct.
LEE STROHL. Appendicitis.

ST. MARY OF NAZARETH HOSPITAL

A. PARTIPILO. Aseptic gastro-intestinal anastomosis.
P. CZWALINSKI. Surgical incisions.
F. TENOZAR. Abdominal operations.

WESLEY MEMORIAL HOSPITAL

E. B. PERRY and H. E. E. BARNARD. Abdominal surgery.

FRANCES E. WILLARD HOSPITAL

OTIS M. WALTER. Clinic.

WOMEN AND CHILDREN'S HOSPITAL

EMELIA GIRYOTAS. Cholecystectomy.

## *Friday Morning*

### ALBERT MERRITT BILLINGS HOSPITAL

H. LIVINGSTONE. Anesthesia and the circulation.
N. ROOME, H. WILSON, H. N. HARKINS and D. B. PHEMISTER. Causes and treatment of surgical shock.
W. E. ADAMS. Intrathoracic operation and the circulation.

### COLUMBUS HOSPITAL

M. J. SEIFERT and F. X. O'MALLEY. Gastro-intestinal surgery.

### COOK COUNTY HOSPITAL

DR. GATEWOOD. Children's surgery.
RALPH C. SULLIVAN, VERNON C. DAVID, HARRY JACKSON and FRANK J. JIRKA. Operations.
Members of the surgical staff will give demonstrations in surgical technique upon cadavers and dogs in the laboratories of the Graduate School of Medicine, 427 S. Honore Street.

### HOLY CROSS HOSPITAL

FRANK FRAIDER and NICHOLAS PAVLETIC. Hysterectomy; cesarean section; cholecystectomy.
STEPHEN BIEZIS. Cholecystectomy; hysterectomy; repair of incisional hernia.
FELIX WINSKUNAS. Inguinal herniorrhaphy.
JAMES GALLAGHER. Cholecystectomy.
WILLIAM REILLY. Cholecystectomy and appendectomy.
M. J. BADZMIEROWSKI and H. IRACE. Hysterectomy.

### ILLINOIS MASONIC HOSPITAL

CHARLES H. PARKES, CARL F. STEINHOFF and WALTER C. BORNEMEIER. Surgical diabetes—organization of the service for the care of the surgical diabetic where an intimate relationship exists between the surgeon and the internist which is greater than that of a consultation; review of cases on service for past ten years; presentation of treatment involved in surgical diabetes, protomine insulin; anesthesia; operative and postoperative cases, lower extremity.
JOHN R. HARGER and JOHN H. GILMORE. Gall-bladder surgery—history building: Personal history in detail, laboratory findings and practical values of various tests; x-ray, development to date in this diagnostic field; demonstration of operative technique with use of peridural route for anesthesia in the cases, discussion of advantages of peridural anesthesia over spinal and lessening of hazard; greater satisfaction than with any type of general.

### JACKSON PARK HOSPITAL

A. BAMBERGER, H. H. COX and C. CLARK. Operations.

### LUTHERAN DEACONESS HOSPITAL

JOHN D. KOUCKY, G. H. MAMMEN and GEORGE H. SCHROEDER. Operations.
GEORGE O. SOLEM. Surgical indications in peptic ulcer.

### MOUNT SINAI HOSPITAL

A. A. STRAUSS, S. F. STRAUSS and B. SAYRE. Operations.
M. LEWISON. Surgery in cardiovascular diseases.
H. J. ISAACS. Coronary disease simulating acute abdominal catastrophies.
E. B. FRELICH. Surgery in tuberculosis.
I. DAVIDSOHN. Clinical pathological conference.

### PASSAVANT MEMORIAL HOSPITAL

SAMUEL J. FOGELSON. Experimental surgical problems.

### POSTGRADUATE HOSPITAL

L. ZIMMERMAN. Varicose veins and their complications.

### PRESBYTERIAN HOSPITAL

V. C. DAVID, KELLOGG SPEED, C. B. DAVIS, DR. GATEWOOD, WILLIAM MILLER and A. H. MONTGOMERY. Operations.

### MICHAEL REESE HOSPITAL

J. PATEJDL, P. SHAPIRO, R. CRAWFORD, B. PORTIS, S. GOLDBERG, M. L. PARKER and LEO ZIMMERMAN. Operations.

### RESEARCH AND EDUCATIONAL HOSPITALS

R. B. MALCOLM. Operative clinic: Neck dissection; carcinoma of breast; surgical pathology of breast tumors.
Clinical Demonstration
T. J. WACHOWSKI. X-ray treatment of carcinoma of the breast.
ARRIE BAMBERGER. Ewing tumor with case report.
S. R. ROSENTHAL. The toxin and antitoxin of burns.
W. H. COLE. Acute pancreatitis.

### ST. ANTHONY DE PADUA HOSPITAL

J. J. SPRAFKA. Abdominal surgery and demonstration.

### ST. ELIZABETH'S HOSPITAL

E. D. KALZELAGE. Thyroid disease.

### ST. LUKE'S HOSPITAL

MEDICAL BOARD. Staff clinic, including papers, discussion and pathological demonstrations.

### WESLEY MEMORIAL HOSPITAL

EARL LATIMER. Unusual breast tumors.

## *Friday Afternoon*

### COOK COUNTY HOSPITAL

J. G. FROST. Operations.
SUMNER L. KOCH. Surgery of the hand.
E. H. WARSZEWSKI. Operations.

### HOLY CROSS HOSPITAL

CHARLES GALANTI. Osteogenic sarcoma.
EMIL WEISS. Splenomegaly.

### JACKSON PARK HOSPITAL

HARRY E. L. TIMM. Operations.

### MOUNT SINAI HOSPITAL

I. DAVIDSOHN. Differential diagnosis of infectious mononucleosis simulating surgical conditions; demonstration of technique.

### ST. BERNARD'S HOSPITAL

J. M. MAHONEY. Infective granuloma of the cecum simulating a neoplasm; case demonstration.

### ST. ELIZABETH'S HOSPITAL

J. K. NARAT. Pre- and postoperative intravenous administration of fat emulsion.

## *Days to be Announced*

### COOK COUNTY HOSPITAL

VICTOR L. SCHRAGER. Symposium: Appendicitis.
SUMNER L. KOCH. Symposium: Hand infections.
HARRY JACKSON. Symposium: Skull fractures.
EDWIN M. MILLER. Symposium: Children's surgery.
FREDERICK G. DYAS. Symposium: Peritonitis.
MARSHALL DAVISON. Symposium: Diseases of the thyroid.
VERNON C. DAVID. Symposium: Surgery of large bowel.

# GYNECOLOGY AND OBSTETRICS

## *Monday Afternoon*

### CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR and staff. Motion picture demonstration of cesarean section.

### COOK COUNTY HOSPITAL

FREDERICK H. FALLS. Operations.
A. F. LASH. Puerperal sepsis; ward walk.

### HOLY CROSS HOSPITAL

PAUL LAWLER. Application of obstetrical forceps (manikin demonstration).

### ILLINOIS MASONIC HOSPITAL

HAROLD W. MILLER and WALTER BORNEMEIER. Ovarian cysts; uterine fibroids. Dry clinic for demonstration of cases and general discussion; operation during which use and value of peritoneoscope will be demonstrated.
F. O. BOWE and BEULAH WALLIN. Cesarean section: Indications, comparison of results in different types, demonstration of operative technique of low cesarean section.

### ST. BERNARD'S HOSPITAL

E. A. RACH and F. J. STUCKER. Cesarean section.

### ST. LUKE'S HOSPITAL

OBSTETRICAL STAFF. Ward walk.

### WOMEN AND CHILDREN'S HOSPITAL

ANNIE E. BLOUNT. Operations.

## *Tuesday Morning*

### CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR, WILLIAM J. DIECKMANN, M. EDWARD DAVIS, H. C. HESSELTINE and staff. Cesarean section. Motion picture demonstration of colpocleisis operation.

### COOK COUNTY HOSPITAL

CAREY CULBERTSON and A. E KANTER. Operations.
D. S. HILLIS. Treatment of abortion; ward walk.

### PRESBYTERIAN HOSPITAL

N. S. HEANEY, CAREY CULBERTSON, A. E. KANTER, E. D. ALLEN and H. BOYSEN. Operations.

### MICHAEL REESE HOSPITAL

J. L. BAER, J. E. LACKNER, WILLIAM RUBOVITS, I. F. STEIN and RALPH REIS. Operations.
JOSEPH L. BAER. Ward rounds.
WILLIAM RUBOVITS. Ward rounds.

### ST. LUKE'S HOSPITAL

H. O. JONES and associates. Demonstration clinic.
W. T. CARLISLE. Endometrial studies.
EUGENE CARY. Treatment of occiput posterior.

### WESLEY MEMORIAL HOSPITAL

MARK GOLDSTINE and associates. Uterine bleeding.

### FRANCES E. WILLARD HOSPITAL

ASCHER H. GOLDFINE. Clinic.

### WOMEN AND CHILDREN'S HOSPITAL

MARY EDITH WILLIAMS. Removal of abdominal tumors.
OTILLIE ZELEZNY. Electrocoagulation of the cervix uteri.

## *Tuesday Afternoon*

### CHICAGO LYING-IN HOSPITAL

WILLIAM J. DIECKMANN and staff. Dry clinic: Eclampsia. Motion picture demonstration of forceps delivery.

### COOK COUNTY HOSPITAL

J. P. GREENHILL. Operations.
L. RUDOLPH and J. H. BLOOMFIELD. Symposium: The toxemias of pregnancy.

### PASSAVANT MEMORIAL HOSPITAL

ARTHUR H. CURTIS and GEORGE H. GARDNER. Operative and demonstration clinic.

### ST. BERNARD'S HOSPITAL

S. S. SCHOCHET. Fibroids.

### ST. ELIZABETH'S HOSPITAL

J. R. LAVIERI. Cesarean section.

### ST. MARY OF NAZARETH HOSPITAL

L. KOZAKIEWICZ and M. UZNANSKI. Toxemias of pregnancy.

### FRANCES E. WILLARD HOSPITAL

ASCHER H. GOLDFINE. Clinic.

### WOMEN AND CHILDREN'S HOSPITAL

ELOISE PARSONS. Vaginal hysterectomy; vaginal sterilization; ligation of tubes per vaginal route.

## *Wednesday Morning*

### CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR, WILLIAM J. DIECKMANN, M. EDWARD DAVIS, H. C. HESSELTINE and staff. Operations and demonstration of cases.

### COOK COUNTY HOSPITAL

C. W. BARRETT. Operations.
J. E. FITZGERALD. Heart disease in pregnancy; ward walk.

### EVANGELICAL DEACONESS HOSPITAL

A. J. SCHOENBERG. Hysterectomy.

### JACKSON PARK HOSPITAL

CHARLES F. GREENE, LOUIS H. STERN, W. J. NIXON-DAVIS, JR. and NORMAN ZOLLA. Treatment of contracted pelves by cesarean section, version and forceps.

### PASSAVANT MEMORIAL HOSPITAL

GEORGE H. GARDNER and ARTHUR H. CURTIS. Gynecological pathology—demonstration and conference.

### PRESBYTERIAN HOSPITAL

N. S. HEANEY, CAREY CULBERTSON, A. E. KANTER, E. D. ALLEN and H. BOYSEN. Demonstration of cases.

### RESEARCH AND EDUCATIONAL HOSPITALS

FREDERICK H. FALLS. Eclamptogenic toxemia, low cervical cesarean section under local anesthesia.
W. H. BROWNE. Progestin in the treatment of abortion.
G. H. REZEK. Modification of the Friedmann reaction.

### MICHAEL REESE HOSPITAL

JOSEPH L. BAER. Ward rounds.
WILLIAM RUBOVITS. Ward rounds.

Dry Clinic

JOSEPH L. BAER. Shifting trends in the treatment of prolapse of the uterus.
JULIUS E. LACKNER. Recent investigations in the action of progesterone.
WILLIAM RUBOVITS. Postoperative vaginal antisepsis.
IRVING F. STEIN. Evaluation of the "safe period."
RALPH A. REIS. Mammography.
LESTER E. FRANKENTHAL, JR. Treatment of vulvovaginitis.
MICHAEL L. LEVENTHAL. The Manchester operation for the cure of cystocele and prolapse.
HENRY BUXBAUM. The role of spermotoxin in temporary sterility.
A. F. LASH. Early diagnosis of carcinoma of the uterus.
E. J. DECOSTA. The use of progesterone in the prevention of habitual abortion.
ALFRED J. KOBAK. Maternal mortality in Chicago.
HERMAN STRAUSS. Routine palpation of the ureters during hysterectomy.

ST. LUKE'S HOSPITAL

GEORGE C. FINOLA. Blood calcium studies during pregnancy.
JAMES A. GOUGH. Chorionepithelioma.

WASHINGTON BOULEVARD HOSPITAL

PAUL C. FOX. Sterility.

WESLEY MEMORIAL HOSPITAL

CHARLES B. REED, WILLIAM B. SERBIN and G. C. RICHARDSON. Moving picture demonstration of low forceps, breech extraction with forceps on aftercoming head, spontaneous breech—manual aid.

WOMEN AND CHILDREN'S HOSPITAL

FLORENCE HARK. Prenatal care with reference to the baby.
RUTH R. DARROW. Treatment of icterus gravis.
BERTHA VAN HOOSEN. Maternity mortality.

*Wednesday Afternoon*

CHICAGO LYING-IN HOSPITAL

H. C. HESSELTINE and staff. Nonconvulsive toxemia of pregnancy. Motion picture of birth injury.

CHICAGO MEMORIAL HOSPITAL

PAUL M. CLIVER, JULIA C. STRAWN, HARRY L. MEYERS, B. E. TUCKER and WALTER WIBORG. Plastic repair.
JAMES E. FITZGERALD, WILLIAM F. HEWITT, GEORGE N. SCHIFF and HARRY BENARON. Cesarean section.

COOK COUNTY HOSPITAL

W. T. CARLISLE. Operations.
D. S. HILLIS, J. H. BLOOMFIELD and A. F. LASH. Symposium: Cesarean section.

RESEARCH AND EDUCATIONAL HOSPITALS

FREDERICK H. FALLS and staff. Operations. Symposium: Gynecological tumors.
FREDERICK H. FALLS. Vulva carcinoma, demonstration of cases, vulvectomy under local anesthesia.
R. A. LIFVENDAHL. Solid tumors of ovary; removal of ovarian cyst.
H. H. HILL. Early carcinoma of cervix.

WOMEN AND CHILDREN'S HOSPITAL

CONSTANCE O'BRITIS. Operations.
BERTHA VAN HOOSEN and MAUDE HALL WINNETT. Anesthesia in obstetrics.
BEATRICE E. TUCKER. Parasacral anesthesia.

*Thursday Morning*

CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR, WILLIAM J. DIECKMANN, M. EDWARD DAVIS, H. C. HESSELTINE and staff. Cesarean section. Motion picture demonstration of blood transfusion.

CHICAGO MEMORIAL HOSPITAL

PAUL M. CLIVER, JULIA C. STRAWN, HARRY L. MEYERS, BEATRICE E. TUCKER and WALTER WIBORG. Symposium: The treatment of prolapse of the uterus, cystocele and rectocele at various ages.
JAMES E. FITZGERALD, WILLIAM F. HEWITT, GEORGE N. SCHIFF and HARRY BENARON. Indications and technique for cesarean section; nerve block in obstetrics.

COOK COUNTY HOSPITAL

EGON W. FISCHMANN. Operations.
J. E. FITZGERALD and L. RUDOLPH. Symposium: Ectopic pregnancy, its diagnosis and treatment.

MOUNT SINAI HOSPITAL

A. H. KLAWANS. Endometriosis.
A. E. KANTER. Masculinizing tumors of ovary.
A. F. LASH. Pelvic infections.
A. H. E. GOLDFINE, C. NEWBERGER, H. BUXBAUM and associates. Symposium: Obstetrical hemorrhages.
L. RUDOLPH. Physiological and clinical aspect of occipito-posterior position.
A. ARKIN, I. A. RABENS and R. GORDON. Dry clinic.

PRESBYTERIAN HOSPITAL

N. S. HEANEY, CAREY CULBERTSON, A. E. KANTER, E. D. ALLEN and H. BOYSEN. Operations.

MICHAEL REESE HOSPITAL

JOSEPH L. BAER. Ward rounds.
WILLIAM RUBOVITS. Ward rounds.

ST. ANTHONY DE PADUA HOSPITAL

M. A. WEISSKOPF. Operations.

ST. LUKE'S HOSPITAL

H. K. GIBSON. The late toxemias of pregnancy.

WESLEY MEMORIAL HOSPITAL

MARK GOLDSTINE and associates. Vaginal plastics.

*Thursday Afternoon*

CHICAGO LYING-IN HOSPITAL

M. EDWARD DAVIS and staff. Placenta prævia; abruptio placenta. Motion picture of postpartum hemorrhage.

COOK COUNTY HOSPITAL

FREDERICK H. FALLS. Operations.
J. H. BLOOMFIELD and D. S. HILLIS. Symposium: Late hemorrhages of pregnancy.

PASSAVANT MEMORIAL HOSPITAL

ARTHUR H. CURTIS and GEORGE H. GARDNER. Operative and demonstration clinic.

ST. MARY OF NAZARETH HOSPITAL

H. LITTLE. Ovarian tumors.

*Friday Morning*

CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR, WILLIAM J. DIECKMANN, M. EDWARD DAVIS, H. C. HESSELTINE and staff. Cesarean section.

COOK COUNTY HOSPITAL

A. E. KANTER and CAREY CULBERTSON. Operations.
A. F. LASH. Toxemias of pregnancy; ward walk.

PRESBYTERIAN HOSPITAL

N. S. HEANEY, CAREY CULBERTSON, A. E. KANTER, E. D. ALLEN and H. BOYSEN. Operations.

MICHAEL REESE HOSPITAL

J. L. BAER, J. E. LACKNER, WILLIAM RUBOVITS, I. F. STEIN and RALPH REIS. Operations.
JOSEPH L. BAER. Ward rounds.
WILLIAM RUBOVITS. Ward rounds.

ST. BERNARD'S HOSPITAL

J. B. HAEBERLIN. Hysterectomy and its indications.

ST. LUKE'S HOSPITAL

JAMES E. FITZGERALD. Heart disease in pregnancy.

WESLEY MEMORIAL HOSPITAL

CHARLES B. REED, WILLIAM B. SERBIN and G. C. RICHARDSON. Ablatio placenta; placenta prævia.

WOMEN AND CHILDREN'S HOSPITAL

BERTHA VAN HOOSEN and MAUDE HALL WINNETT. Surgical cases complicating obstetrics.

*Friday Afternoon*

CHICAGO LYING-IN HOSPITAL

FRED L. ADAIR and staff. Dry clinic. Motion picture demonstration of episiotomy.

COOK COUNTY HOSPITAL

CAREY CULBERTSON. Operations.

L. RUDOLPH. Symposium: Prolonged labor; constriction ring dystocia.

MERCY HOSPITAL

H. E. SCHMITZ and associates. Symposium on operative gynecology.

RESEARCH AND EDUCATIONAL HOSPITALS

FREDERICK H. FALLS and staff. Symposium: Gynecological plastic operations with special reference to the use of local anesthesia.
FREDERICK H. FALLS. Vaginal hysterectomy for procidentia under local anesthesia.
M. J. SUMMERVILLE. Anterior colporrhaphy and interposition operation under local anesthesia.
WILLIAM H. BROWNE. Sturmdorf-Kelly incontinence operation and perineorrhaphy under local anesthesia.

WOMEN AND CHILDREN'S HOSPITAL

CATHERINE TRUE. Abdominal gynecological cases.
ELOISE PARSONS. Treatment of sterility; treatment of eroded cervix by cautery; lipiodol visualization of uterus and tubes.

*Days to be Announced*

COOK COUNTY HOSPITAL

J. P. GREENHILL, C. W. BARRETT, W. T. CARLISLE, EGON W. FISCHMANN, FREDERICK H. FALLS, A. E. KANTER and CAREY CULBERTSON. Symposium on fibroids.

HENROTIN HOSPITAL

EDWARD L. CORNELL. Operations and demonstration of cases.
CHANNING W. BARRETT and LEE STONE. Operations and demonstration of cases.

## ORTHOPEDIC SURGERY

*Monday Afternoon*

RESEARCH AND EDUCATIONAL HOSPITALS

H. B. THOMAS, F. W. HARK and C. N. LAMBERT. Symposium: Tenodesis. Operations and demonstration of cases; tendon transplantations.

ST. LUKE'S HOSPITAL

F. A. CHANDLER and JOHN R. NORCROSS. Spondylolisthesis; aseptic necrosis of the head of the femur.

*Tuesday Morning*

CHILDREN'S MEMORIAL HOSPITAL

F. CHANDLER, F. SEIDLER, C. PEASE and J. NORCROSS. Operations and demonstration of cases.

COLUMBUS HOSPITAL

E. H. SLOTT and I. E. SLOTT. Sciatica.

COOK COUNTY HOSPITAL

ARTHUR CONLEY. Operations and symposium with demonstration of cases; blind pegging of hip for fracture of neck of femur, using Kirschner wire and Smith-Petersen nail; problems in diagnosis of bone tumors; painful back in medicolegal cases; persistent dizziness following head injuries; fractures in and about the ankle.
MARCUS H. HOBART. Operation: Removal of internal semilunar cartilage. Demonstration of cases: Recurrent dislocations of shoulder, internal derangement of knee joint, spinal fusions, low back pain, acquired dislocations of hip following scarlet fever, syndactylism.

PRESBYTERIAN HOSPITAL

E. J. BERKHEISER. Dry clinic and demonstration of cases.

MICHAEL REESE HOSPITAL

PHILIP LEWIN, DANIEL LEVINTHAL, CHARLES PEASE, F. GLASSMAN, SIDNEY SIDEMAN, JEROME G. FINDER and I. WOLIN. Operations.

ST. LUKE'S HOSPITAL

F. A. CHANDLER and JOHN R. NORCROSS. Chordotomy for chorio-athetosis; spina bifida.

*Tuesday Afternoon*

MOUNT SINAI HOSPITAL

C. JACOBS. Orthopedic demonstrations.
L. MILLER. Visualization of joints.
J. FINDER. Giant cell tumor of bone.
F. GLASSMAN. Nonunion of neck of femur.

ST. LUKE'S HOSPITAL

H. A. SOFIELD. Fracture of the neck of the femur, treated by steel pin method of fixation. Lantern slides, cases.
E. W. RYERSON. Injuries and anomalies of the spine.
R. O. RITTER. Fractures and infantile paralysis.

WESLEY MEMORIAL HOSPITAL

F. M. JANSEY, H. KELIKIAN and O. H. HORRALL. Bone and joint surgery.

*Wednesday Morning*

LUTHERAN DEACONESS HOSPITAL

EMIL VRTIAK. Indications for surgical treatment of arthritis.

MUNICIPAL TUBERCULOSIS SANITARIUM

E. J. BERKHEISER. Bone tuberculosis.

ST. BERNARD'S HOSPITAL

L. B. DONKLE and M. E. CREIGHTON. Fractures of the shaft of the femur.

ST. LUKE'S HOSPITAL

E. W. RYERSON and associates. Operations.

WESLEY MEMORIAL HOSPITAL

PHILIP H. KREUSCHER and associates. Bone and joint surgery; knee injuries.

*Wednesday Afternoon*

EVANSTON HOSPITAL

J. L. PORTER and R. C. LONERGAN. Low back disorders.

MERCY HOSPITAL

J. D. CLARIDGE and associates. Problems in orthopedic and traumatic surgery.

PASSAVANT MEMORIAL HOSPITAL

EMIL HAUSER and associates. Surgery of the knee and foot—demonstration of cases and lantern slides: Total tendon transplant for slipping patella; injuries of the external semilunar cartilage; loose body, the result of a semilunar cartilage injury; manipulative correction of deformity; tendon transplant as a routine procedure to triple arthrodesis of the paralytic foot; reconstruction operation for hallux valgus.

PRESBYTERIAN HOSPITAL

E. J. BERKHEISER, KELLOGG SPEED and D. RIDER. Operations.

MICHAEL REESE HOSPITAL

PHILIP LEWIN. Fracture problems; new approach for arthrodesis of knee joint; discussion of bone tumors; motion picture demonstration of manipulative surgery.

SIDNEY SIDEMAN. Rice bodies in tendon sheath of the hand; Hoke stabilization of the foot; spastic paralysis; roentgenologic library of the hip joint; fusion operation in tuberculosis of the knee joint; bunion operation; multiple cartilaginous exostosis.

DANIEL H. LEVINTHAL and IRVING WOLIN. Tendon transplantation in poliomyelitis, spastic paralysis, recurrent dislocation of shoulder, flat feet; demonstration of arthroplasties of the knee, hip and elbow, knee joint surgery.

CHARLES PEASE. Acute transverse atrophy of bone; traumatic rupture of intervertebral disc; reduction of compression fracture of spine, osteochondromatosis of the elbows.

JEROME G. FINDER. Chondromyxosarcoma, two cases; flexorplasty of the thumb for paralytic opponens pollicis; osteochondroma of the tibia; McBride bunion plasty; unusual bone tumor (?) of femur; Key operation for soft corns; spastic paralysis—bilateral adductor tenotomy and obturator nerve neurectomy, case with unusual deformities.

FRANK GLASSMAN. Fracture and dislocation of shoulder; supracondylar fracture of the humerus; fracture of the neck of the femur; complete fracture of the tibia and fibula; removal of the head of the radius, three cases; osteoma of the femur; demonstration of various types of fractures and treatment.

ST. ANTHONY DE PADUA HOSPITAL

THOMAS DWYER. New bone biopsy trephine, pathological specimens.

ST. LUKE'S HOSPITAL

H. B. THOMAS, FRED HARK and CLAUDE LAMBERT. Whitman's reconstruction of the hip, good range of motion; Volkmann's contracture, a plea for early treatment; echinococcus cyst of the os ilium; chronic arthritis joints, arthroplasty.

*Thursday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

Presentation on Bone and Joint Surgery

E. L. COMPERE. Leg lengthening operation, technique and results; spinal fusion in the correction of scoliosis.

C. H. HATCHER. The pathology and treatment of tuberculous arthritis; studies in the rate of skeletal growth and equalization of limb length.

H. N. HARKINS. Bone graft for ununited fracture.

P. C. BUCY and R. B. CLOWARD. Spinal extradural cyst and its relation to kyphosis dorsalis juvenilis.

C. B. HUGGINS. Studies in the distribution of red bone marrow and the reticuloendothelial system in the skeleton.

COOK COUNTY HOSPITAL

DANIEL H. LEVINTHAL. Bone graft surgery for nonunion, stabilization and benign bone tumors. Motion picture demonstration: Surgical treatment of spastic paralysis; surgical treatment of residual paralysis following poliomyelitis.

PHILIP H. KREUSCHER. Nicola operation; semilunar cartilage derangement; spinal grafts; new operation for hip fusion; new operation for knee fusion.

PHILIP LEWIN. Tunnel skin graft over os calcis; spondylolisthesis; stabilization of paralytic varus foot; arthrodesis of ankle joint; hallux varus; tuberculous spine, fusion; infantile paralysis; low back pain with "sciatica."

FRANK G. MURPHY. Skin grafts for old wounds of leg; unusual bone tumors; fracture into ankle joint; malunion of Colles' fracture; tuberculosis of cuneiform bone; scar contracture of forearm, skin graft.

ILLINOIS MASONIC HOSPITAL

CHARLES N. PEASE and EDGAR WHITE. Tuberculosis of the knee; fractures about the elbow in children; reduction of fractures of the spine; traumatic rupture of the intervertebral disc.

MICHAEL REESE HOSPITAL

PHILIP LEWIN, DANIEL LEVINTHAL, CHARLES PEASE, F. GLASSMAN, I. WOLIN, SIDNEY SIDEMAN and JEROME G. FINDER. Operations.

ST. BERNARD'S HOSPITAL

S. L. GOVERNALE. Pseudomuscular dystrophy; case demonstration.

J. G. FROST. Metastatic hypernephroid carcinoma of the femur.

R. S. WESTLINE and E. L. ARENSDORF. Fractures of the wrist joint.

ST. LUKE'S HOSPITAL

E. W. Ryerson and associates. Clinic.

ST. MARY OF NAZARETH HOSPITAL

L. Czaja. Clinic.

VETERANS ADMINISTRATION FACILITY

S. K. Livingston. Operations.

*Thursday Afternoon*

COOK COUNTY HOSPITAL

E. J. Berkheiser. Operations and demonstration of cases —spondylolisthesis, anterior poliomyelitis, arthrodesis and tendon transplantation.

PRESBYTERIAN HOSPITAL

E. J. Berkheiser and D. Rider. Operations.

RESEARCH AND EDUCATIONAL HOSPITALS

H. B. Thomas, F. W. Hark and C. N. Lambert. Operation: Shelving of a congenital dislocated hip. Demonstration of patients with closed reduction, open reduction, and shelving of congenital dislocation.

VETERANS ADMINISTRATION FACILITY

S. K. Livingston. Symposium: Bone tumors.

*Friday Morning*

LUTHERAN DEACONESS HOSPITAL

Emil Vrtiak. Indications for surgical treatment of arthritis.

PRESBYTERIAN HOSPITAL

E. J. Berkheiser, Kellogg Speed and D. Rider. Operations.

ST. BERNARD'S HOSPITAL

Chester C. Guy. Surgical pathology of bone tumors.

VETERANS ADMINISTRATION FACILITY

S. K. Livingston. Symposium: Maggot treatment of osteomyelitis.

*Friday Afternoon*

ST. LUKE'S HOSPITAL

F. A. Chandler and John R. Norcross. Knee fusion; giant cell tumor of spine, cyst of femur.

## GENITO-URINARY SURGERY

*Monday Afternoon*

COLUMBUS HOSPITAL

William Gehl, Frank L. Chenoweth, H. E. Davis and I. F. Volini. Resectoscope for bladder carcinoma.

*Tuesday Morning*

MOUNT SINAI HOSPITAL

H. Rolnick, H. Soloway and E. Hirsch. Symposium: Tumors of the kidney.

PASSAVANT MEMORIAL HOSPITAL

L. L. Veseen, V. D. Lespinasse, Harry Culver and Fred Lieberthal. Symposium: Tuberculosis of the urinary tract.

PRESBYTERIAN HOSPITAL

Herman L. Kretschmer, Robert Herbst and associates. Operations.

MICHAEL REESE HOSPITAL

I. Koll, J. Eisenstaedt, H. Rolnick, I. Shapiro, J. Grove, F. Lieberthal and A. E. Jones. Symposium: Carcinoma of the urinary bladder.

ST. JOSEPH'S HOSPITAL

Charles M. McKenna. Undescended testicle.

ST. MARY OF NAZARETH HOSPITAL

J. Welfeld. Urologic clinic: Malignancy of tumors of the bladder in children.

WESLEY MEMORIAL HOSPITAL

V. D. Lespinasse and associates. Clinic. Presentation of cases.

WOMEN AND CHILDREN'S HOSPITAL

Marie Ortmayer and Pearl M. Stetler. Clinic.

*Tuesday Afternoon*

RESEARCH AND EDUCATIONAL HOSPITALS

C. M. McKenna, R. D. Herrold and staff. Operations and demonstrations: Experimental and clinical studies on various types of urinary antiseptics; anomalies with special reference to undescended testicle and hypospadias.

ST. ANTHONY DE PADUA HOSPITAL

O. J. Jirsa. Prostatic management; carcinoma of bladder; pyelography.

*Wednesday Morning*

CHICAGO MEMORIAL HOSPITAL

J. William Parker and John P. O'Neil. Operations.

COOK COUNTY HOSPITAL

Harry Culver, L. L. Veseen, Charles McKenna and Harry Rolnick. Operations.

GARFIELD PARK HOSPITAL

Vincent J. O'Conor, C. C. Saelhof and associates. More recent advances in infections in the urinary tract.

MERCY HOSPITAL

H. E. Landes. Symposium: Transurethral resection.

J. E. Laibe and associates. Kidney anomalies; treatment of neoplasms of the urinary tract.

MUNICIPAL TUBERCULOSIS SANITARIUM

Dorrin Rudnick. Tuberculosis of the urinary tract.

PRESBYTERIAN HOSPITAL

Herman L. Kretschmer, Robert Herbst and associates. Operations.

MICHAEL REESE HOSPITAL

I. Koll, J. Eisenstaedt, H. Rolnick, I. Shapiro, J. Grove, F. Lieberthal and A. E. Jones. Operations

*Wednesday Afternoon*

CHICAGO MEMORIAL HOSPITAL

J. WILLIAM PARKER, JOHN P. O'NEIL, E. J. STIEGLITZ, D. G. BRUNJES, OTTO SAPHIR and GEORGE M. LANDAU. Symposium: Kidney infections.

M. L. WEINSTEIN, J. WILLIAM PARKER and JOHN P. O'NEIL. Transurethral resection of the prostate.

R. A. MELENDY, J. WILLIAM PARKER, JOHN P. O'NEIL and OTTO SAPHIR. Tuberculosis of urinary tract in males.

EVANSTON HOSPITAL

J. I. FARRELL. Undescended testicles.

ST. ANNE'S HOSPITAL

HARRY J. DOOLEY. Urological clinic, demonstrations.

ST. BERNARD'S HOSPITAL

ANDREW SULLIVAN. Operations.

ST. ELIZABETH'S HOSPITAL

T. G. MCDOUGALL. Carcinoma of the bladder.

*Thursday Morning*

CHILDREN'S MEMORIAL HOSPITAL

HERMAN L. KRETSCHMER and K. BARBER. Operations.

COOK COUNTY HOSPITAL

HARRY CULVER and CHARLES MCKENNA. Symposium: Chronic bladder neck obstructions in the male.

ILLINOIS MASONIC HOSPITAL

EDWARD W. WHITE, ROBERT H. HAYES and JOHN H. GILMORE. Renal tuberculosis: Avenues of transmission, discussion of the pathogenesis and morbidity, primary foci and complicating factors in relation to general tuberculosis, roentgenological aspects; concerning prostatic resection.

CLARENCE C. SAELHOF and JOHN H. GILMORE. Carcinoma of bladder—diagnosis, type of treatment and approach, result and cases; renal calculi—multiple stone in reduplicated pelvis, diagnosis, treatment by heminephrectomy; operative cases; malignancy of prostate gland—diagnosis, method of immediate relief for obstructive symptoms, postoperative radiation therapy and results, cases; roentgenological advances in urologic diagnosis.

JACKSON PARK HOSPITAL

WILLIAM YONKER. Transurethral prostatic resection compared to other types of prostatic surgery.

PRESBYTERIAN HOSPITAL

HERMAN L. KRETSCHMER, ROBERT HERBST and associates. Operations.

MICHAEL REESE HOSPITAL

I. KOLL, J. EISENSTAEDT, H. ROLNICK, I. SHAPIRO, J. GROVE, F. LIEBERTHAL and A. E. JONES. Operations.

ST. JOSEPH'S HOSPITAL

CHARLES M. MCKENNA. Undescended testicle.

ST. LUKE'S HOSPITAL

L. E. SMITH, HARRY CULVER and associates. Genito-urinary clinic: Urinary calculi.

VETERANS ADMINISTRATION FACILITY

T. G. MCDOUGALL. Carcinoma of the bladder.

WASHINGTON BOULEVARD HOSPITAL

VINCENT J. O'CONOR. Plastic on renal pelvis for hydronephrosis; review of various types of hydronephrosis with exhibition of films and pathologic specimens.

WESLEY MEMORIAL HOSPITAL

V. D. LESPINASSE and associates. Clinic.

*Friday Morning*

EVANGELICAL DEACONESS HOSPITAL

PAUL MORF. Nephrolithotomy.

ILLINOIS MASONIC HOSPITAL

C. OTIS RITCH. Nephrectomy; transurethral prostatic resection; urological clinic: Anomalies of upper urinary tract, bilateral and unilateral complete reduplication of kidneys and ureters, incomplete reduplication of kidneys and ureters, bifid pelves, ureteral buds; renal tuberculosis

PRESBYTERIAN HOSPITAL

HERMAN L. KRETSCHMER, ROBERT HERBST and associates. Dry clinic.

VETERANS ADMINISTRATION FACILITY

T. G. MCDOUGALL. Perineal prostatectomy.

*Days to be Announced*

COOK COUNTY HOSPITAL

L. L. VESEEN and HARRY ROLNICK. Symposium: Pyogenic infections of the upper urinary tract.

## THORACIC SURGERY

*Monday Afternoon*

MUNICIPAL TUBERCULOSIS SANITARIUM

Collapse Therapy Clinic
23 N. Wacker Drive

STAFF. Demonstration of collapse therapy measures on ambulatory patients; discussion of indications, results, complications and technique.

*Tuesday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

W. E. ADAMS and associates. Experimental esophageal surgery.

COLUMBUS HOSPITAL

R. M. DAVISON, C. VOLINI, M. JOANNIDES, D. ORTH and G. MUELLER. Symposium on tuberculosis: Thoracic surgery; pneumothorax treatment including climatotherapy.

COOK COUNTY HOSPITAL

JOHN B. O'DONOGHUE and ROBERT LEE. Treatment of empyema; ward walk and presentation of cases.

RESEARCH AND EDUCATIONAL HOSPITALS

WILLARD VAN HAZEL. Operations with demonstration of cases.

ST. JOSEPH'S HOSPITAL

WILLIAM C. BECK. Thoracic surgery.

VETERANS ADMINISTRATION FACILITY

JEROME K. HEAD. New type of thoracoplasty; chest surgery.

*Tuesday Afternoon*

COOK COUNTY HOSPITAL

RALPH B. BETTMAN. Operations.

PRESBYTERIAN HOSPITAL

JOHN DORSEY. Dry clinic and demonstration.

RESEARCH AND EDUCATIONAL HOSPITALS

WILLARD VAN HAZEL and staff. Symposium: Bronchogenic carcinoma.
S. LEVINSON. Pathology.
ADOLPH HARTUNG. Roentgenological diagnosis.
PAUL H. HOLINGER. Bronchogenic aspects.
WILLARD VAN HAZEL. Surgical consideration; demonstration of cases and specimens; surgical treatment of mediastinal tumors.
T. J. WACHOWSKI. Roentgenological consideration of mediastinal tumors.
M. JOANNIDES. Collapse therapy of pulmonary tuberculosis.

*Wednesday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

W. E. ADAMS and associates. Intrathoracic neoplasms.

EVANSTON HOSPITAL

JEROME R. HEAD. Indications for lobectomy.

MUNICIPAL TUBERCULOSIS SANITARIUM

RICHARD DAVISON. Thoracoplasty.
Collapse Therapy Clinic
23 N. Wacker Drive
STAFF. Phrenics, artificial pneumothorax, pneumoperitoneum.

ST. BERNARD'S HOSPITAL

R. J. DREVER. The rational treatment of empyema; demonstration of cases.
S. L. GOVERNALE and F. F. FIORE. Congenital cyst of the lung; demonstration of cases.

*Wednesday Afternoon*

MUNICIPAL TUBERCULOSIS SANITARIUM

M. JOANNIDES. Phrenic surgery; intrapleural pneumolysis.

PRESBYTERIAN HOSPITAL

JOHN DORSEY. Operations.

ST. LUKE'S HOSPITAL

WILLARD VAN HAZEL. Chest surgery, demonstration of cases.
PAUL HOLINGER. Bronchogenic aspect of chest surgery.

*Thursday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

W. E. ADAMS and associates. Operations.

ILLINOIS MASONIC HOSPITAL

MINAS JOANNIDES. Phrenic neurectomy, phrenic crush, scaleniotomy; artificial pneumoperitoneum; eleothorax. Dry clinic: Eleothorax-Indications, technique and complications; advantages of artificial pneumoperitoneum as an adjunct to phrenic neurectomy.

MUNICIPAL TUBERCULOSIS SANITARIUM

RICHARD DAVISON. Thoracoplasty; pneumolysis.

ST. JOSEPH'S HOSPITAL

WILLIAM C. BECK. Thoracic surgery.

*Thursday Afternoon*

COOK COUNTY HOSPITAL

RALPH B. BETTMAN. Operations.

PRESBYTERIAN HOSPITAL

JOHN DORSEY. Operations.

MICHAEL REESE HOSPITAL

RALPH B. BETTMAN and WILLIAM TANNENBAUM. Thoracic surgery.

ST. BERNARD'S HOSPITAL

A. H. MONTGOMERY and R. E. CUMMINGS. Pericarditis with effusion; demonstration of case.

*Friday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

W. E. ADAMS and associates. Intrathoracic operations and the circulation (experimental and case presentation).

MUNICIPAL TUBERCULOSIS SANITARIUM

(Collapse Therapy Clinic, 23 N. Wacker Drive)
STAFF. Pneumolysis, oleothorax, artificial pneumothorax, pneumoperitoneum.

MICHAEL REESE HOSPITAL

RALPH B. BETTMAN and WILLIAM TANNENBAUM. Thoracoplasty operation.
MAX BIESENTHAL. Surgery of pulmonary tuberculosis.
MAX BIESENTHAL and RALPH B. BETTMAN. Technique of various operations used for pulmonary tuberculosis: Artificial pneumothorax, pneumolysis, thoracoplasty; motion picture and diagrammatic demonstrations.
RALPH B. BETTMAN. Treatment of empyema; injuries of the chest; presentation of cases; motion picture and diagrammatic demonstrations.

WOMEN AND CHILDREN'S HOSPITAL

HELEN HAYDEN, EMELIA GIRYOTAS, MARGARET AUSTIN and NORA B. BRANDENBURG. Bronchoscopy in relation to asthma and allied pulmonary conditions; lipiodol injection.

*Friday Afternoon*

COOK COUNTY HOSPITAL

JOHN B. O'DONOGHUE, FREDERICK TICE, RICHARD JAFFE, M. J. HUBENY, S. H. ROSENBLUM and A. J. HRUBY. Symposium: Pulmonary tuberculosis.
JOHN B. O'DONOGHUE. Operations.

PRESBYTERIAN HOSPITAL

JOHN DORSEY. Operations.

*Daily*

ST. LUKE'S HOSPITAL

PAUL HOLINGER. Exhibit.

# FRACTURES AND TRAUMATIC SURGERY

## *Monday Afternoon*

### COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Operative fractures.

### JACKSON PARK HOSPITAL

S. W. M. ROBINSON, C. W. HENNAN and M. J. MILLS. Traumatic surgery.

### ST. ANTHONY DE PADUA HOSPITAL

F. W. SLOBE. Fractures; phases of traumatic surgery.

### ST. LUKE'S HOSPITAL

HART E. FISHER. Electrical injuries, shock, burns and glare injury to the eyes with their preventive phases, treatment, resuscitation, etc. Evolution of resuscitation showing various methods from ancient time down to the present. Manual, mechanical and medical methods. Lantern slide and motion picture demonstration.

T. HANSON and J. JANSEN. Treatment of comminuted fractures of the leg.

## *Tuesday Morning*

### CHICAGO MEMORIAL HOSPITAL

ARTHUR H. CONLEY and S. PERRY ROGERS. Symposium: Blind pegging of fractures of the femur.

FRED MILLER, T. C. BROWNING, EMILE DUVAL and G. M. LANDAU. Fracture of both bones of lower leg.

### COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Ward walk.

### ST. JOSEPH'S HOSPITAL

HUGH MCKENNA. Demonstration clinic.

### ST. LUKE'S HOSPITAL

H. E. MOCK, A. R. MORROW and C. E. SHANNON. Skull fracture exhibit.

### WASHINGTON BOULEVARD HOSPITAL

ARTHUR R. METZ. Treatment of unusual fractures.

## *Tuesday Afternoon*

### CHICAGO MEMORIAL HOSPITAL

C. R. G. FORRESTER, HORACE STIMSON and A. H. MASON. Symposium: Fractures; nerve repair.

### COOK COUNTY HOSPITAL

SUMNER L. KOCH and associate. Tendon and nerve suturing of the hand; hand infections.

### ST. LUKE'S HOSPITAL

R. R. DUFF and R. R. DUFF, JR. The use of adhesive plaster in the treatment of burns; simple traction in dislocations of the shoulder, elbow and Colles' fracture.

### VETERANS ADMINISTRATION FACILITY

S. K. LIVINGSTON. Dry clinic.

## *Wednesday Morning*

### COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Ward walk.

FREDERICK DYAS. Ward walk (female).

### EVANSTON HOSPITAL

DWIGHT CLARK. Fractures about the knee joint.

### ST. ANNE'S HOSPITAL

THOMAS E. MEANY. Fractures and tendon transplantations.

### ST. BERNARD'S HOSPITAL

L. B. DONKLE and M. E. CREIGHTON. Fractures of the shaft of the femur.

### ST. LUKE'S HOSPITAL

H. E. MOCK, A. R. MORROW and C. E. SHANNON. Skull fracture exhibit.

JOHN D. ELLIS. Treatment of traumatic back injuries.

## *Wednesday Afternoon*

### COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS, JAMES J. CALLAHAN, CARLO S. SCUDERI, FREDERICK DYAS and GEORGE L. APFELBACH. Symposium: Knee joint injuries.

### PASSAVANT MEMORIAL HOSPITAL

PAUL B. MAGNUSON and JAMES K. STACK. Symposium on fractures.

### ST. LUKE'S HOSPITAL

C. G. SHEARON and GRAHAM KERNWEIN. Infections of the hand.

## *Thursday Morning*

### COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Ward walk.

### GARFIELD PARK COMMUNITY HOSPITAL

J. J. CALLAHAN, H. N. WAIT and MILTON SCHMITT. Demonstration clinic.

### JACKSON PARK HOSPITAL

ARRIE BAMBERGER. Demonstration clinic.

### ST. BERNARD'S HOSPITAL

R. S. WESTLINE and E. L. ARENSDORF. Fractures of the wrist joint.

### ST. JOSEPH'S HOSPITAL

HUGH MCKENNA. Demonstration clinic.

### ST. LUKE'S HOSPITAL

H. E. MOCK, A. R. MORROW and C. E. SHANNON. Skull fracture exhibit.

H. E. MOCK and associates. Hip fracture demonstration.

WILL LYON. Early closure of open wounds.

### ST. MARY OF NAZARETH HOSPITAL

L. CZAJA. Symposium: Late results of fractures.

### U. S. MARINE HOSPITAL

HORACE P. STIMSON. Ununited fractures with osteomyelitis.

E. C. LUTTON and R. W. FLYNN. Skeletal traction and countertraction in treatment of fractures.

### FRANCES E. WILLARD HOSPITAL

JAMES A. VALENTINE. Clinic.

*Thursday Afternoon*

CHICAGO MEMORIAL HOSPITAL

ARTHUR H. CONLEY and S. PERRY ROGERS. Blind pegging of fractures of the femur.
FRED MILLER, T. C. BROWNING, EMILE DUVAL and G. M. LANDAU. Fracture of both bones of lower leg.

COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Operative fractures.
GEORGE L. APFELBACH. Ward walk (female).

JACKSON PARK HOSPITAL

S. W. M. ROBINSON, C. W. HENNAN and M. J. MILLS. Traumatic surgery.

FRANCES E. WILLARD HOSPITAL

FRED CARLS. Clinic.

WOMEN AND CHILDREN'S HOSPITAL

ARMINA HILL. Minor injuries.
MARY E. WILLIAMS. Fractures; dislocations.

*Friday Morning*

CHICAGO MEMORIAL HOSPITAL

C. R. G. FORRESTER, HORACE STIMSON and A. H. MASON. Fractures; nerve repair.

COOK COUNTY HOSPITAL

WILLIAM R. CUBBINS and associates. Follow-up clinic: demonstration of cases.

ST. LUKE'S HOSPITAL

H. E. MOCK, A. R. MORROW and C. E. SHANNON. Skull fracture exhibit.

*Friday Afternoon*

COLUMBUS HOSPITAL

F. MUELLER. Fractures.
W. L. BEECHER. Traumatic surgery.

COOK COUNTY HOSPITAL

JAMES J. CALLAHAN and CARLO S. SCUDERI. Cadaver demonstrations.

*Days to be Announced*

COOK COUNTY HOSPITAL

DR. GATEWOOD. Symposium: Fractures in children.

HENROTIN HOSPITAL

ARTHUR R. CONLEY. Demonstration clinic.

## NEUROSURGERY

*Monday Afternoon*

COOK COUNTY HOSPITAL

H. C. VORIS and J. J. KEARNS. Intracranial injury—demonstration of pathology, physiology, management, surgical interference, sequelæ, complications.

*Tuesday Morning*

RESEARCH AND EDUCATIONAL HOSPITALS

GEZA DETAKATS. Operation: Lumbar sympathectomy.
Symposium: Neurocirculatory Diseases
R. BRUNNER. The use of neosynephrine in spinal anesthesia.
WILLIAM C. BECK. Selection of cases for sympathectomy; demonstration of sympathectomized patients; evaluation of results; the management of lymphedema.
F. K. HICK. Vascular accidents associated with coronary occlusion.
H. C. LUETH. Unusual reactions following the use of nitroglycerine.
GEZA DETAKATS. The treatment of acute arterial occlusion; operability of hypertension, demonstration of cases.
H. L. MISHKIN and P. J. SARMA. The treatment of varicose veins and ulcers.
J. T. REYNOLDS. Amputations in peripheral vascular disease.

*Tuesday Afternoon*

MERCY HOSPITAL

C. F. SCHAUB and H. C. VORIS. Neuro-ophthalmology: Presentation of cases with fundi, perimetric field findings; discussion of diagnostic problems; presentation and discussion of cases of recurrent papilledema following cranial explorations and decompressions.

PRESBYTERIAN HOSPITAL

A. VERBRUGGHEN. Dry clinic and demonstration.

ST. LUKE'S HOSPITAL

ERIC OLDBERG. Operation.
GEZA DETAKATS. Demonstration of late results in patients following sympathectomy for neurocirculatory disorders.
JOHN COULTER. Physical therapy in the treatment of peripheral vascular disease.
GEORGE K. FENN. The management of the surgical diabetic.
CARL A. JOHNSON. Neosynephrine in postoperative shock.
RICHARD CAPPS. The carotid sinus syndrome and its surgical significance.
GEORGE SCUPHAM. Classification in hypertension.

*Wednesday Morning*

RESEARCH AND EDUCATIONAL HOSPITALS

ERIC OLDBERG. Operations and demonstration of cases.

*Wednesday Afternoon*

COOK COUNTY HOSPITAL

A. VERBRUGGHEN. Surgical paraplegia—etiology, pathology, classification, physiology, treatment, prognosis.

PRESBYTERIAN HOSPITAL

A. VERBRUGGHEN. Operations.

*Thursday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

P. C. BUCY and R. B. CLOWARD. Spinal extradural cyst and its relation to kyphosis dorsalis juvenilis.

RESEARCH AND EDUCATIONAL HOSPITALS

ERIC OLDBERG. Operations and demonstration of cases.

*Thursday Afternoon*

MERCY HOSPITAL

H. C. VORIS and associates. Symposium: Management of cerebral gliomas.

H. C. VORIS and H. E. LANDES. Demonstration of choroid plexus resection in hydrocephalus; cytometric studies in neurological lesions.

C. F. SCHAUB and H. C. VORIS. Neuro-ophthalmology: Presentation of cases with fundi, perimetric field findings; discussion of diagnostic problems; presentation and discussion of cases of recurrent papilledema following cranial explorations and decompressions.

PRESBYTERIAN HOSPITAL

A. VERBRUGGHEN. Operations.

MICHAEL REESE HOSPITAL

Symposium: Intracranial Suppuration

ROY GRINKER. Neurological aspects of intracranial suppuration.

A. VERBRUGGHEN. Surgical aspects of brain abscess.

*Friday Afternoon*

PASSAVANT MEMORIAL HOSPITAL

LOYAL DAVIS and JOHN MARTIN. Neurological surgery: Presentation of cases emphasizing diagnosis and treatment.

PRESBYTERIAN HOSPITAL

A. VERBRUGGHEN. Operations.

ST. LUKE'S HOSPITAL

ERIC OLDBERG. Operation.

## EXPERIMENTAL SURGERY

*Friday Morning*

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

LEON ARIES. Acceleration of bone growth and repair as determined by deposition of dye in the callus. (By feeding dogs dyes which are deposited in the callus, experimental fractures are studied to determine what substances accelerate bone growth and repair.) Lantern slide demonstration.

R. A. BUSSABARGER, S. FREEMAN and A. C. IVY. The rôle of the stomach in calcification of bone. (Demonstration of gastrectomized puppies showing homogenous osteoporosis. This demonstration shows the necessity of observance of dietary care in gastrectomized patients.) Lantern slide demonstration.

ELMER J. KOCUR. The effect of various foods upon bile secretion with and without return of bile to the gastro-intestinal tract. (Demonstration of animals. This shows the necessity of adequate dietary control of patients with biliary fistulas.)

C. R. SCHMIDT and J. M. BEAZELL. The effect of diet on pancreatic secretion. (The results obtained guide the postoperative care of a patient with duodenal fistula.)

WILLIAM BACHRACH and SAMUEL J. FOGELSON. Common duct transplantation. (Demonstration of animal. Results obtained show the site of implantation of the common duct is important in preventing subsequent ascending infections of the biliary passages.)

MICHAEL L. MASON and HARVEY S. ALLEN. Experimental studies on tendon repair. (Histologic studies of tendon repair after use of varied suture material, grafts and different techniques.)

LEO M. ZIMMERMAN. Surgical repair of inguinal hernia as guided by anatomical studies. (A simplification of surgical technique for the treatment of inguinal hernia after evaluating the anatomy.)

JOHN MARTIN. The negative effects of midbrain lesions upon the gastric secretion, motility and gastro-intestinal ulceration in monkeys and cats. A Horsley-Clarke apparatus was used to produce midbrain lesions in cats and monkeys. No changes were observed in gastro-intestinal function and activity.

H. CHOR. The rational of physical therapy in the treatment of muscle disorders. Experimental observations on massage, passive movement, of electrical stimulation and of rest upon muscle atrophy and regeneration in the lower motor neuron type of paralysis.

MICHAEL REESE HOSPITAL

STAFF. Demonstration in experimental surgery.

*Days to be Announced*

ALBERT MERRITT BILLINGS HOSPITAL

LABORATORY STAFF. Demonstration.

RESEARCH AND EDUCATIONAL HOSPITALS

WARREN H. COLE and associates. Demonstration.

## PLASTIC AND FACIOMAXILLARY SURGERY

*Monday Afternoon*

ILLINOIS EYE AND EAR INFIRMARY

SAMUEL SALINGER. Facial plastic surgery.

SIDNEY POLLACK. Nasal fractures.

BERNARD M. COHEN. Nasal and ear prostheses.

*Tuesday Morning*

CHICAGO MEMORIAL HOSPITAL

CASPER M. EPSTEIN. Plastic, faciomaxillary surgery.

COOK COUNTY HOSPITAL

JOSEPH E. SCHAEFER. Demonstration of cases showing corrected temporomandibular ankylosis, harelips and cleft palates; pedicle flap and full thickness graft cases; repair of burns, traumatic injuries; plastic repairs of controlled carcinoma cases.

ST. JOSEPH'S HOSPITAL

WILLIAM H. G. LOGAN. Oral surgery.

*Tuesday Afternoon*

PRESBYTERIAN HOSPITAL

FREDERICK MOOREHEAD and R. OLMSTED. Operations.

MICHAEL REESE HOSPITAL

SAMUEL SALINGER and CASPER EPSTEIN. Nasal and facial plastic surgery; treatment of injuries to the face.

*Wednesday Morning*

ST. LUKE'S HOSPITAL

H. A. POTTS and F. W. MERRIFIELD. Demonstration clinic.

*Wednesday Afternoon*

MOUNT SINAI HOSPITAL

E. AISON and associates. Oral surgery.

PRESBYTERIAN HOSPITAL

FREDERICK MOOREHEAD and R. OLMSTED. Operations.

*Thursday Morning*

COOK COUNTY HOSPITAL

JOSEPH E. SCHAEFER. Demonstration of cases showing carcinoma of mouth, lips and face, with colored photographs of lesions before and after radiation.

MICHAEL REESE HOSPITAL

CASPER EPSTEIN. Oral surgery.

ST. JOSEPH'S HOSPITAL

WILLIAM H. G. LOGAN. Oral surgery.

*Thursday Afternoon*

PRESBYTERIAN HOSPITAL

FREDERICK MOOREHEAD and R. OLMSTED. Dry clinic.

*Friday Morning*

ST. LUKE'S HOSPITAL

H. A. POTTS and F. W. MERRIFIELD. Demonstration clinic.

*Friday Afternoon*

CHILDREN'S MEMORIAL HOSPITAL

L. W. SCHULTZ. Dry clinic and demonstration.

PRESBYTERIAN HOSPITAL

FREDERICK MOOREHEAD and R. OLMSTED. Operations.

RESEARCH AND EDUCATIONAL HOSPITALS

L. W. SCHULTZ. Oral surgery with particular reference to cleft palates and harelips.

*Day to be Announced*

COOK COUNTY HOSPITAL

I. MUSKAT. Plastic surgery of the nose and face.

## PHYSICAL THERAPY

*Monday Afternoon*

COOK COUNTY HOSPITAL

DISRAELI KOBAK. General physical therapy procedures.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

JOHN S. COULTER and S. L. OSBORNE. Clinical and experimental investigations of short wave medical diathermy.

MICHAEL REESE HOSPITAL

C. O. MOLANDER. Ward walks; physiotherapy methods.

*Tuesday Morning*

COOK COUNTY HOSPITAL

DISRAELI KOBAK. In posttraumatic conditions.

MUNICIPAL TUBERCULOSIS SANITARIUM

JOHN S. COULTER and LEO HARDT. Ultraviolet radiation in the treatment of gastro-intestinal tuberculosis.

*Tuesday Afternoon*

COOK COUNTY HOSPITAL

I. F. HUMMON. Physical therapy in infantile paralysis.

MICHAEL REESE HOSPITAL

S. PERLOW and C. O. MOLANDER. Physical therapy in the treatment of circulatory disturbances.

*Wednesday Morning*

COOK COUNTY HOSPITAL

DISRAELI KOBAK. In postoperative, traumatic infections.

GARFIELD PARK COMMUNITY HOSPITAL

MILTON SCHMITT. Hyperpyrexia in gonorrheal arthritis.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

HERMAN CHOR. Rationale of physical therapy in muscle disorders.

JOHN S. COULTER. Demonstration of clinical and experimental results.

MICHAEL REESE HOSPITAL

FRANK GLASSMAN and C. O. MOLANDER. Physical therapy in the treatment of fractures.

*Wednesday Afternoon*

COOK COUNTY HOSPITAL

I. F. HUMMON. Physical therapy in neurosurgical and neurological conditions.

GARFIELD PARK COMMUNITY HOSPITAL

MILTON G. SCHMITT. The value of heating tissues by induction hyperpyrexia.

PASSAVANT MEMORIAL HOSPITAL

J. S. COULTER. Physical therapy in fractures.

SUMNER L. KOCH, MICHAEL L. MASON and J. S. COULTER. Physical therapy in hand injuries.

MICHAEL REESE HOSPITAL

I. WOLIN and C. O. MOLANDER. Physical therapy in the treatment of poliomyelitis.

SIDNEY SIDEMAN and C. O. MOLANDER. Physical therapy in treatment of spastics.

*Thursday Morning*

COOK COUNTY HOSPITAL

DISRAELI KOBAK. Physical therapy in low back conditions.

ILLINOIS CENTRAL HOSPITAL

JOHN S. COULTER. Under water exercises in the treatment of fractures of weight-bearing bones.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

J. S. COULTER and S. L. OSBORNE. Hyperpyrexia in chronic infectious arthritis.

F. CHANDLER, J. R. NORCROSS and J. S. COULTER. Management of low back conditions.

MICHAEL REESE HOSPITAL

BERT FINNE. Hyperpyrexia in the treatment of gonorrheal arthritis.

*Thursday Afternoon*

COOK COUNTY HOSPITAL

I. F. HUMMON. Manipulative treatment in low back conditions.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

EMIL HAUSER and J. S. COULTER. The rôle of physical therapy in common disorders of the foot.

MICHAEL REESE HOSPITAL

JULIUS GRINKER and C. O. MOLANDER. Physical therapy in treatment of peripheral nerve injuries.

*Friday Morning*

COOK COUNTY HOSPITAL

DISRAELI KOBAK. Physical therapy in bursitis.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

J. S. COULTER. Physical therapy in traumatic arthritis.

MICHAEL REESE HOSPITAL

LESTER FRANKENTHAL and C. O. MOLANDER. Physical therapy in treatment of chronic pelvic inflammation.

*Friday Afternoon*

COOK COUNTY HOSPITAL

I. F. HUMMON. Physical therapy in the prevention of deformities.

ST. LUKE'S HOSPITAL

JOHN S. COULTER. Physical therapy in reconstruction surgery.

## ROENTGENOLOGY

*Monday Afternoon*

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Lesions of terminal ileum.

*Tuesday Morning*

LUTHERAN DEACONESS HOSPITAL

RALPH WILLY. Newer concepts in the treatment of carcinoma.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Exhibit of interesting cases; pathology shown by x-ray.

ST. MARY OF NAZARETH HOSPITAL

C. J. CHALLENGER. X-ray studies of surgical conditions.

*Tuesday Afternoon*

ST. ANTHONY DE PADUA HOSPITAL

L. S. TICHY. Silicosis demonstration.

ST. BERNARD'S HOSPITAL

B. C. CUSHWAY, R. J. MAIER and E. K. LEWIS. Roentgen therapy of inflammation and infections of the face and neck.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Gall-bladder visualization following medical treatment.

*Wednesday Morning*

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Gall-bladder visualization following surgical drainage.

*Wednesday Afternoon*

AUGUSTANA HOSPITAL

DAVID S. BEILEN. Roentgen diagnosis of gastro-intestinal lesions.

ALBERT MERRITT BILLINGS HOSPITAL

PAUL C. HODGES and associates. X-ray diagnosis.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Interesting bone pathology.

*Thursday Morning*

LUTHERAN DEACONESS HOSPITAL

RALPH WILLY. Newer concepts in the treatment of carcinoma.

PASSAVANT MEMORIAL HOSPITAL

JAMES T. CASE. Technical considerations in gastro-intestinal radiology; round table discussion on radiation therapy of carcinoma of breast.

EARL BARTH. The evolution of primary tuberculous infection of the lungs in roentgenograms; round table discussion on miscellaneous roentgen therapeutic applications.

RESEARCH AND EDUCATIONAL HOSPITALS

ADOLPH HARTUNG. Conference on x-ray diagnosis, with particular reference to bone dystrophy, lesions of the urinary tract, brain tumors and unusual lesions of the gastro-intestinal tract.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Exhibit of interesting cases; pathology shown by x-ray.

*Thursday Afternoon*

COOK COUNTY HOSPITAL

ROBERT F. MCNATTIN. High voltage therapy of malignancies.

M. J. HUBENY. Roentgenological examination of appendix.

MOUNT SINAI HOSPITAL

MAX COHN, G. DANELIUS and E. LEWIN. Demonstrations of interesting radiologicosurgical conditions.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. W. HUNTER and W. WASKOW. Malignancies of lungs.

*Friday Morning*

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Exhibit of interesting cases; pathology shown by x-ray.

*Friday Afternoon*

AUGUSTANA HOSPITAL

DAVID S. BEILEN. Roentgen diagnosis of lesions of urinary tract.

COOK COUNTY HOSPITAL

J. PAUL BENNETT. Roentgenological examination of the kidneys, ureters and bladder.

ROBERT F. MCNATTIN. High voltage therapy of malignancies.

ST. LUKE'S HOSPITAL

E. L. JENKINSON, E. W. ROBERTS, A. F. HUNTER and W. WASKOW. Exhibit of interesting cases; pathology shown by x-ray.

*Days to be Announced*

HENROTIN HOSPITAL

ARTHUR R. HANSEN. X-ray demonstration.

WESLEY MEMORIAL HOSPITAL

FRANK L. HUSSEY. The interpretation of x-ray findings in obscure gastric and duodenal lesions; the use of x-ray in conjunction with surgery of the large bowel.

## TUMORS AND IRRADIATION

*Monday Afternoon*

ST. ELIZABETH'S HOSPITAL

J. BRAMS. Radium treatment of fractures.

VETERANS ADMINISTRATION FACILITY

G. R. ALLABEN. Regular tumor clinic.

*Tuesday Morning*

LUTHERAN DEACONESS HOSPITAL

ISADORE PILOT. Pathology of malignant growths in relation to therapeutic indications.

MICHAEL REESE HOSPITAL

MAX CUTLER, JEROME F. STRAUSS and SAMUEL PEARLMAN. Radium therapy in malignant tumors of the head and neck; demonstration of cases and technique.

ST. ELIZABETH'S HOSPITAL

M. G. LUKEN. Sarcoma of the stomach.

VETERANS ADMINISTRATION FACILITY

A. E. WILLIAMS. Deep x-ray and radium therapy.

*Tuesday Afternoon*

RAVENSWOOD HOSPITAL

C. BUSWELL, J. J. MOORE, H. P. SAUNDERS and L. E. SCHAEFFER. Cancer clinic, presentation of specimens, lantern slides, cases illustrating melanomas of shoulder and jaw.

RESEARCH AND EDUCATIONAL HOSPITALS

WILLARD VAN HAZEL and staff. Symposium: Bronchogenic carcinoma.

S. LEVINSON. Pathology.

ADOLPH HARTUNG. Roentgenological diagnosis.

PAUL H. HOLINGER. Bronchogenic aspects.

WILLARD VAN HAZEL. Surgical consideration; demonstration of cases and specimens; surgical treatment of mediastinal tumors.

T. J. WACHOWSKI. Roentgenological consideration of mediastinal tumors.

M. JOANNIDES. Collapse therapy of pulmonary tuberculosis.

*Wednesday Morning*

ALBERT MERRITT BILLINGS HOSPITAL

Presentation on Tumor Surgery

A. BRUNSCHWIG. Experimental production of tumors and the efficacy of Coley's toxin in the treatment of experimental sarcoma; palliative treatment of pulmonary metastases from malignant tumors; late results in treatment of benign giant cell tumors of bone.

D. B. PHEMISTER and associates. Studies in the etiology, diagnosis and treatment of bone tumors.

HARWELL WILSON. Extraskeletal ossifying tumors.

VETERANS ADMINISTRATION FACILITY

MAX CUTLER. Annual tumor clinic: Presentation of cancer cases, indications, technique and results of radium therapy.

G. R. ALLABEN. Diagnosis and treatment.

### *Thursday Morning*

COLUMBUS HOSPITAL

D. A. ORTH, M. HANNAN and H. E. DAVIS. Breast cancer.

LUTHERAN DEACONESS HOSPITAL

ISADORE PILOT. Pathology of malignant growths in relation to therapeutic indications.

MERCY HOSPITAL

W. J. PICKETT. Unusual cases of malignancy.

MICHAEL REESE HOSPITAL

MAX CUTLER and staff. Results of radiation treatment of cancer of mouth, tonsil, pharynx and larynx; presentation of cases. Radiation treatment of cancer of the breast; presentation of cases. Motion pictures illustrating technique of radium treatment of cancer of mouth and cancer of cervix. Transillumination of breast.

ST. ELIZABETH'S HOSPITAL

LEO M. ZIMMERMAN. Mediastinal tumors.

VETERANS ADMINISTRATION FACILITY

A. E. WILLIAMS. Inspection of deep x-ray and radium therapy unit.

WESLEY MEMORIAL HOSPITAL

GUY S. VAN ALSTYNE. Carcinoma of the breast; combined surgical and x-ray treatment.

### *Thursday Afternoon*

PASSAVANT MEMORIAL HOSPITAL

MAX CUTLER. The organization of a tumor clinic: Personnel, equipment, records, follow-up.

Carcinoma of the Breast

JOHN A. WOLFER. Surgical considerations.
JAMES T. CASE. Pre- and postoperative x-ray radiation.
L. M. ROSENTHAL. Radium treatment.
MAJOR GREENE. Bronchiogenic tumors of the neck.
JOHN F. DELPH and EARL BARTH. Carcinoma of the larynx, hypopharynx and tonsil.
JOHN MOHARDT. A survey of some proposed cancer cures.

RESEARCH AND EDUCATIONAL HOSPITALS

Symposium: Diseases of the Gastro-Intestinal Tract

GEORGE MILLES. Pathology of carcinoma of stomach.
W. H. COLE. Total gastrectomy.
T. J. WACHOWSKI. X-ray diagnosis of carcinoma of stomach.
C. L. BIRCH. Anemia associated with total gastrectomy.
M. H. STREICHER. Diagnosis of carcinoma of the rectum.
C. B. PUESTOW. Surgical treatment of carcinoma of the rectum.
BERNARD PORTIS. Surgical treatment of complicated duodenal ulcers.
F. L. MCMILLAN. Regional ileitis.
J. L. SPIVACK. Tubovalvular stoma with particular reference to gastrostomy.
H. O. WERNICKE. The injection treatment of hernias.

### *Friday Morning*

MERCY HOSPITAL

HENRY L. SCHMITZ and associates. Symposium: Radiologic therapy of malignancy.

RESEARCH AND EDUCATIONAL HOSPITALS

R. B. MALCOLM. Operations: Neck dissection; carcinoma of breast; surgical pathology of breast tumors.
T. J. WACHOWSKI. X-ray treatment of carcinoma of breast.
ARRIE BAMBERGER. Ewing tumor with case report.

ST. BERNARD'S HOSPITAL

CHESTER C. GUY. Surgical pathology of bone tumors.

ST. LUKE'S HOSPITAL

H. E. MOCK, WILLIAM BROWN, E. W. RYERSON, E. F. HIRSCH and E. L. JENKINSON. Tumor clinic: Demonstration of pathology; diagnosis; treatment of malignancies of the breast and collar bone.

VETERANS ADMINISTRATION FACILITY

G. R. ALLABEN. Regular tumor clinic.

WESLEY MEMORIAL HOSPITAL

EARL LATIMER. Unusual breast tumors.

### *Friday Afternoon*

PRESBYTERIAN HOSPITAL

CARL APFELBACH and F. SQUIRE. Dry clinic.

### *Day to be Announced*

HENROTIN HOSPITAL

SAMUEL LEVINSON. Surgical pathology.

## OPHTHALMOLOGY

### *Monday Afternoon*

ALBERT MERRITT BILLINGS HOSPITAL

A. C. KRAUSE. Fundus diagnosis.

CHILDREN'S MEMORIAL HOSPITAL

G. GUIBOR. Orthoptics.

COOK COUNTY HOSPITAL

E. B. FOWLER. Fundus diagnostic clinic.

ILLINOIS EYE AND EAR INFIRMARY

R. VON DER HEYDT. Operation for glaucoma and cataract.
DWIGHT C. ORCUTT. Dry clinic.

MERCY HOSPITAL

C. F. SCHAUB, F. I. BARNETT and E. A. ROLING. Fundus clinic.

MICHAEL REESE HOSPITAL

PHILIP HALPER. Orthoptics.

RUSH MEDICAL COLLEGE

DR. HOLMES. Orthoptics.

### *Tuesday Morning*

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

GEORGE GUIBOR. Orthoptic training; classification of squint.
SANFORD R. GIFFORD. Concomitant and paralytic squint.

RUSH MEDICAL COLLEGE

DR. WILBER. Histopathology.

### *Tuesday Afternoon*

ALBERT MERRITT BILLINGS HOSPITAL

C. V. DEVNEY. Orthoptics.

COLUMBUS HOSPITAL

M. GOLDENBURG. Eye clinic.

COOK COUNTY HOSPITAL

C. F. YERGER. Medical ophthalmology.

ILLINOIS EYE AND EAR INFIRMARY

THOMAS D. ALLEN. Operation for glaucoma and cataract.
LOUIS HOFFMAN and E. K. FINDLAY. Dry clinics.

MERCY HOSPITAL

C. F. SCHAUB and H. C. VORIS. Neuro-ophthalmology: Presentation of cases with fundi, perimetric field findings; discussion of diagnostic problems; presentation and discussion of cases of recurrent papilledema following cranial explorations and decompressions.

MOUNT SINAI HOSPITAL

J. LEBENSOHN and E. SELINGER. Clinic.

MICHAEL REESE HOSPITAL

T. M. SHAPIRA. Fundus clinic.

RUSH MEDICAL COLLEGE

DR. JACOBSON. Fundus clinic.

### *Wednesday Morning*

COOK COUNTY HOSPITAL

SANFORD R. GIFFORD. Retinal detachment.

RUSH MEDICAL COLLEGE

W. F. MONCREIFF. Cataract.

### *Wednesday Afternoon*

ALBERT MERRITT BILLINGS HOSPITAL

S. S. BLANKSTEIN. End-results of retinal detachment operations.

CHILDREN'S MEMORIAL HOSPITAL

R. C. GAMBLE and E. A. VORISEK. Diagnostic clinic.

ILLINOIS EYE AND EAR INFIRMARY

DWIGHT C. ORCUTT. Operation for glaucoma and cataract.
S. J. MEYER. Retinal detachment.
K. H. CHAPMAN. Orthoptics.

MERCY HOSPITAL

C. F. SCHAUB, F. I. BARNETT and E. A. ROLING. Fundus clinic.

MICHAEL REESE HOSPITAL

S. J. MEYER and D. SNYDACKER. Retinal detachment clinic.

U. S. MARINE HOSPITAL

ALFRED N. MURRAY. Eye injuries.

### *Thursday Morning*

ILLINOIS MASONIC HOSPITAL

ALVA SOWERS. Cataract extraction employing Elschnig technique; discussion of dinitrophenol cataracts—treatment, results.

### *Thursday Afternoon*

ALBERT MERRITT BILLINGS HOSPITAL

L. BOTHMAN. Macular disease.

COLUMBUS HOSPITAL

M. GOLDENBURG. Eye clinic.

COOK COUNTY HOSPITAL

E. B. FOWLER. Fundus clinic.

ILLINOIS EYE AND EAR INFIRMARY

E. K. FINDLAY and LOUIS HOFFMAN. Operation for glaucoma and cataract.
THOMAS D. ALLEN. Glaucoma.

MERCY HOSPITAL

C. F. SCHAUB and H. C. VORIS. Neuro-ophthalmology: Presentation of cases with fundi, perimetric field findings; diagnostic problems; presentation and discussion of cases of recurrent papilledema following cranial explorations and decompressions.

MICHAEL REESE HOSPITAL

JACK COWAN. Glaucoma clinic.

### *Friday Afternoon*

ALBERT MERRITT BILLINGS HOSPITAL

DR. MCSHELLMAN. Cataract results.

CHILDREN'S MEMORIAL HOSPITAL

R. O. RISER. Diagnostic clinic.

ILLINOIS EYE AND EAR INFIRMARY

S. J. MEYER. Operation for glaucoma and cataract.
R. VON DER HEYDT. Slit-lamp demonstration.

RUSH MEDICAL COLLEGE

E. SELINGER. Medical ophthalmology.

*Days to be Announced*

COLUMBUS HOSPITAL

M. GOLDENBURG. Glaucoma clinic.

HENROTIN HOSPITAL

GEORGE W. MAHONEY, E. A. ROLING and IRVING BARNETT. Eye clinic.

## OTOLARYNGOLOGY

*Monday Afternoon*

COOK COUNTY HOSPITAL

NORMAN LESHIN. Pneumonography: Interesting cases with methods of examination and diagnosis.
SAMUEL PEARLMAN. Carcinoma of the larynx; bronchoscopy, esophagoscopy.

ILLINOIS EYE AND EAR INFIRMARY

SAMUEL SALINGER, SIDNEY POLLACK and BERNARD M. COHEN. Nasal plastic surgery; demonstration of nose and ear prosthesis.

Symposium: Intracranial Otogenic Complications

M. GLATT. Petrositis.
JACOB LIFSCHUTZ. Brain abscess.
C. H. CHRISTOPH. Lateral sinus thrombosis.
SAMUEL SALINGER. Facial plastic surgery, presentation of cases.

RESEARCH AND EDUCATIONAL HOSPITALS

OLIVER E. VAN ALYEA. Surgical anatomy of the nasal sinuses.
MANUEL G. SPIESMAN. Diseases of the pharynx.
SYLVIO A. SCIARETTA. Conservative treatment of chronic suppurative otitis media.

RUSH MEDICAL COLLEGE

LOUIS T. CURRY and FRANK WOJNIAK. Sulfanilamide in the treatment of meningitis.

*Tuesday Morning*

HENROTIN HOSPITAL

M. REESE GUTTMAN. Malignant diseases of the head and neck with special reference to the larynx.

MOUNT SINAI HOSPITAL

JOSEPH C. BECK, ALFRED LEWY, JACOB LIFSCHUTZ, S. M. MORWITZ, FRANCIS L. LEDERER, M. R. GUTTMAN and associates. Clinics.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

J. F. DELPH, A. H. ANDREWS and GLENN J. GREENWOOD. Technique of endobronchial aspiration.
T. P. O'CONNOR. Nasopharyngitis.
MARION A. ANDREEN. Results of different reading methods for raising the temperature of the antrum.
GLENN J. GREENWOOD. Audiometric readings in allergy.
H. C. BALLENGER. Audiometric testing.
J. F. DELPH. Benign tumors of the vocal cords.

MICHAEL REESE HOSPITAL

MAX CUTLER, JEROME E. STRAUSS and SAMUEL PEARLMAN. Radium therapy in malignant tumors of the head and neck, demonstration of cases and technique.

ST. JOSEPH'S HOSPITAL

AUSTIN A. HAYDEN. Conservation of hearing; mastoid and sinus surgery.

*Tuesday Afternoon*

COOK COUNTY HOSPITAL

JACOB LIFSCHUTZ. Demonstration clinic.

MICHAEL REESE HOSPITAL

SAMUEL SALINGER and CASPER EPSTEIN. Nasal and facial plastic surgery; treatment of injuries to the face.

RESEARCH AND EDUCATIONAL HOSPITALS

FRANCIS LEDERER. Ear, nose and throat plastic surgery.
PAUL H. HOLINGER. Diseases of the larynx.

RUSH MEDICAL COLLEGE

ELMER HAGENS and PAUL CAMPBELL. Pathology of the petrous bone in cases dying of meningitis; lantern slides.

ST. MARY OF NAZARETH HOSPITAL

J. J. KILLEEN. Mastoiditis in children.

*Wednesday Morning*

MOUNT SINAI HOSPITAL

JOSEPH C. BECK, ALFRED LEWY, JACOB LIFSCHUTZ, S. M. MORWITZ, FRANCIS LEDERER, M. R. GUTTMAN and associates. Clinics.

ST. ELIZABETH'S HOSPITAL

F. A. DULAK. Ozena.

*Wednesday Afternoon*

RESEARCH AND EDUCATIONAL HOSPITALS

J. THEOBALD. Complications of middle ear infections.
SHERMAN L. SHAPIRO. Neuro-otology.
DR. PELOUZE. Deep neck infections.

RUSH MEDICAL COLLEGE

THOMAS W. LEWIS and RICHARD WATKINS. Causative factors and results of treatment of vasomotor rhinitis with foreign protein.

ST. ANNE'S HOSPITAL

JERRY HAYDEN. Ear, nose and throat clinic.
HARRY M. PETERSON. Surgical demonstration and clinic.

*Thursday Morning*

MERCY HOSPITAL

HERBERT NASH and R. KERWIN. Anatomy and physiology of nose and accessory sinuses.
The Proetz method of visualization showing pictures and demonstration of method.

G. J. Musgrave. Ferris Smith operation.
C. H. Christoph. Maxillary sinuses, intranasal radical.
G. T. Jordan. Caldwell-Luc operation.

MOUNT SINAI HOSPITAL

Joseph C. Beck, Alfred Lewy, Jacob Lifschutz, S. M. Morwitz, Francis Lederer, M. R. Guttman and associates. Clinics.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

L. B. Arey, B. J. Anson, J. Gordon Wilson and associates. Reconstruction of tonsils, stapes, petrous bone.
J. G. Wilson and B. J. Anson. Reconstruction of bone pathology in cases of deafness.
Motion Pictures of Vestibular Reaction
J. F. Delph. Simplified "caloric tests."
J. Gordon Wilson. Spontaneous nystagmus in lesions of the brain.
E. L. Ross. Toxic reactions in animals.

ST. JOSEPH'S HOSPITAL

Austin A. Hayden. Conservation of hearing; mastoid and sinus surgery.

*Thursday Afternoon*

COOK COUNTY HOSPITAL

Norman Leshin. Pneumonography: Interesting cases with methods of examination and diagnosis.
Samuel Pearlman. Carcinoma of the larynx; bronchoscopy, esophagoscopy.

RESEARCH AND EDUCATIONAL HOSPITALS

Nathan H. Fox and John W. Harned, Jr. Rhinologic surgery; allergy in relation to otolaryngology.
Francis Lederer and N. T. Pattengale. Cancer of the ear, nose and throat.

RUSH MEDICAL COLLEGE

George E. Shambaugh, Jr. and Linton Wallner. The treatment of deafness.

*Friday Morning*

COOK COUNTY HOSPITAL

Jacob Lifschutz. Demonstration clinic.

EVANGELICAL DEACONESS HOSPITAL

John M. Bick. Submucous resection and tonsillectomy.

MOUNT SINAI HOSPITAL

Joseph C. Beck, Alfred Lewy, Jacob Lifschutz, S. M. Morwitz, Francis Lederer, M. R. Guttman and associates. Clinics.

*Friday Afternoon*

RESEARCH AND EDUCATIONAL HOSPITALS

A. R. Hollender. Physical therapeutic methods.
W. Theobald. Nasal accessory sinus disease.
Paul H. Holinger. Bronchoscopy and esophagoscopy.

RUSH MEDICAL COLLEGE

Daniel B. Hayden and E. L. Chainski. Conditions producing tinnitus; evaluation of methods of treatment.

*Days to be Announced*

BILLINGS MEMORIAL HOSPITAL

J. R. Lindsay. Petrositis; septic otitis and lateral sinus thrombosis.

CHILDREN'S MEMORIAL HOSPITAL

George Livingston, Paul Holinger and associates. Intracranial complications of ear infections; bronchoscopy in children; endoscopic cases.

COOK COUNTY HOSPITAL

I. Muskat. Plastic surgery of the nose and face.
S. Pearlman. Diseases of the neck and larynx, including laryngoscopy and bronchoscopy.
L. Curry. Mastoiditis and meningitis.
A. Lewy. The mastoid and the labyrinth.
T. C. Galloway and H. E. Davis. Selective treatment in malignancy about the head.

ILLINOIS EYE AND EAR INFIRMARY

Alfred Lewy. Chronic suppurative otitis media.
John Cavanaugh. Chronic sinusitis; diagnosis and surgical treatment.